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# TECHNICAL MANAGEMENT REVIEW

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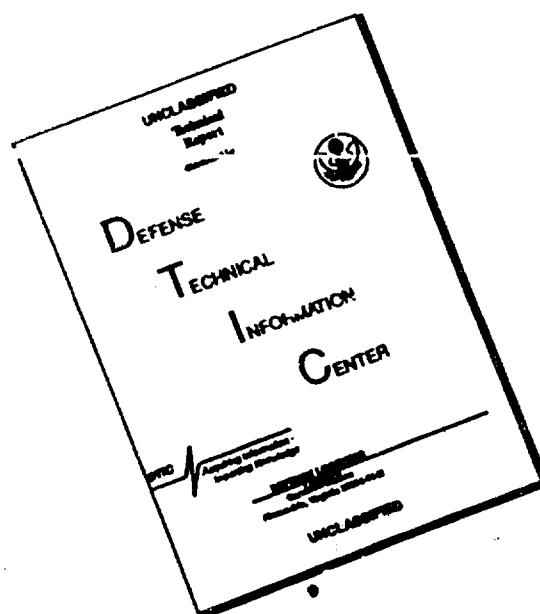


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Harry G. Armstrong  
Aerospace Medical Research Laboratory

TECHNICAL MANAGEMENT REVIEW

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# Identification of Tasks and Task Managers

TASK NUMBER	TASK TITLE	TASK MANAGER	BRANCH	PAGE
2312V1	Toxicological Mechanisms of Air Force Chemicals and Materials	George	THB	A-2-1
2313V1	Electro- and Magnetoencephalographic Indicators of Cognitive Functions	Wilson	HEG	A-2-5
2313V2	Basic Research for Target Acquisition	Cannon	HEF	A-2-9
2313V3	Auditory Information Processing	Moore	BBA	A-2-13
2313V4	Human Performance in Complex Systems	Vikmanis	HEG	A-2-18
272907	Nuclear/Biological/Chemical Operability Assessment	Replogle	HET	A-2-23
272908	Chemical Defense Toxicology	Jarnot	THB	A-2-28
272909	Voice Communications in Chemical Defense	Steuver	BBA	A-2-31
272910	Performance Assessment of Chemical Treatment Drugs	Yates	HEG	A-2-34
630200	Engineering Support Services for the Toxic Hazards Division	McDougal	TH	A-2-37
630201	Toxicology of Aerospace Chemicals and Materials	Tocco	THB	A-2-46
630202	Toxicokinetics and Pharmacodynamics of Air Force Chemicals	George	THB	A-2-54
630208	Toxicology of High Energy Fuels	Mattie	THA	A-2-60
630213	Installation Restoration Program	Jepson	THA	A-2-63
630214	Toxicology in the Operational Environment	Yu	THA	A-2-68
689300	Engineering Support Services for Project 6893	Boff	HE	A-2-72
689301	Optical Countermeasures/Deception	Dowler	HEF	A-2-77
689304	Manned Threat Quantification (MTQ)	Marshak	HED	A-2-82
689306	Human Information Processing and System Control	McMillan	HEF	A-2-87
689311	Experimental Man in Space (EXMIS)	Whiteley	HEF	A-2-93
718400	Engineering Support Services for Project 7184	Boff	HE	A-2-98
718408	Crew Station Design Techniques and Criteria	Vikmanis	HEG	A-2-108
718410	Strategic Avionics Crew Station Design Evaluation Facility (SACDEF)	Marshak	HED	A-2-116
718411	Design Parameters for Visually-Coupled and Visual Display Systems	Kocian	HEA	A-2-125
718412	Human Engineering Applications to Systems Design, Test, and Evaluation	Boff	HE	A-2-134
718414	Performance and Workload Assessment	Reid	HEG	A-2-140
718418	Visual Technology and Performance	Kama	HEF	A-2-148
718419	Integration Criteria for Advanced Technology Aircraft	Eggleson	HEA	A-2-155
718426	Tactical Aircraft Cockpit Development and Evaluation Program (tacdep)	Haas	HEA	A-2-160
718427	C3 Operator Performance Engineering (COPE)	Monk	HEX	A-2-170
723100	Engineering Support Services - Biodynamics and Bioengineering Division	Welde	BB	A-2-174
723120	Biodynamics and Bioengineering Support	Welde	BB	A-2-179
723121	Biocommunications	McKinley	BBA	A-2-186
723122	Escape Accident/Injury Analysis and Exposure Criteria	kazarian	BBA	A-2-193
723123	Human Dynamics in Multiforce Environments	kalaps	BBM	A-2-198
723124	Aeromedical Criteria for Escape Systems	Taylor	BBP	A-2-206
723125	Aircrew Performance Enhancement in Sustained Acceleration	Albery	BBS	A-2-211
723131	Crew Protection for Advanced Escape Systems	Specker	BBP	A-2-217
723132	Voice Technology	Moore	BBA	A-2-225
723133	Audio Communications Countermeasures and Counter-Countermeasures	Moore	BBA	A-2-228
723134	Exploratory Noise and Sonic Boom Research	Speakman	BBA	A-2-232
723135	Advanced Acceleration Protection Systems	Albery	BBS	A-2-238
723136	Advanced Manikin Development	Fasmussen	BBM	A-2-243
723138	Robotic Telepresence	Julian	BBA	A-2-249
723139	Digital Audio Technology for Aircraft	McKinley	BBA	A-2-255



Toxicological Mechanisms of Air Force Chemicals and Materials

TASK MANAGER: Marilyn E George  
THB - AV 785-5150

TASK NUMBER: 2312V1

OBJECTIVES:

1. To provide fundamental information on the mechanisms of systemic, cellular and subcellular toxicity of Air force chemicals.
2. To investigate relationships between toxicity, alterations in lipid metabolism, and altered cell components using perfluorodecanoic acid (PFDA) as a model toxicant.

BACKGROUND:

This information is essential for devising therapy for chemical exposures, suggesting personnel protection protocols, and predicting potential long term effects of these compounds. We have focused our studies on defining the mechanism of toxicity of PFDA, which produces toxic effects very similar to several broad classes of chemicals, e.g. dioxin, certain polyhalogenated biphenyls, and a group of chemicals causing hypolipidemia. By using PFDA as a representative model, information on the mechanism of toxicity of these other chemicals can be projected and investigated. Previous research has shown PFDA interferes with normal lipid metabolism, specifically fatty acid oxidation, resulting in the incorporation of unnatural lipids in cellular structures such as membranes and the production of unnatural cell components.

## AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 2312V1

TASK TITLE: Toxicological Mechanisms of Air Force Chemicals and Materials

MIS CATEGORY: Core

MANAGER: George OFFICE: THB PHONE: 55150 START: 10-SEP-76 STOP: 30-SEP-94 PRIMARY PROGRAM ELEMENT: 61102F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	.00	.00	.00	.00	.00	.00
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	72,413.00	92,000.00	128,000.00	128,000.00	128,000.00	548,413.00
Other Support Costs	57,556.10	68,000.00	58,000.00	58,000.00	58,000.00	299,556.10
External Funding Subtotal	129,969.10	160,000.00	186,000.00	186,000.00	186,000.00	847,969.10
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 129,969.10	\$ 160,000.00	\$ 186,000.00	\$ 186,000.00	\$ 186,000.00	\$ 847,969.10
In-House Labor Hours						
Bartholomew (MILITARY)	596	596	596	596	596	2980
Cason (MILITARY)	506					506
DeRaso	724	724	724	724	724	3620
Dunovant (MILITARY)		1040	1040	1040	1040	4160
Fazekas (MILITARY)	452	516	516	516	516	2516
George	240	447	447	447	447	2028
Jarnot	1344	1377	1544	1544	1544	7353
Mastanka (MILITARY)						
Nichols (MILITARY)	636	1174	1174	1174	1174	636
Schmidt (MILITARY)	1174					5870
Whittaker (MILITARY)	782					782
Total Hours (Person-Years)	6454 (3.1)	5874 (2.8)	6041 (2.9)	6041 (2.9)	6041 (2.9)	30451

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

## WORKUNIT WORKUNIT TITLE

2312V.18	Effects of AF Propellants & Chemicals on Metabolic Mechanism	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
2312V1A	Tracking of supply and equipment funds for task 2312V1	George	IHB	55150	10-SEP-76	01-APR-94
2312V1AB	Tracking of travel funds for task 2312V1	Carpenter	III	55740	06-DEC-82	30-SEP-94
2312V1CB	Cell Biology Research	Carpenter	IH	55740	22-DEC-82	30-SEP-94
		George	IHB	55150	01-APR-87	30-SEP-91

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
2312V118	72413.00	-----	Reimbursed Civilian Pay	AFOSR/2312V11N
2312V1AA	1155.04	-----	F2AMRL00470100/F3360190PA	AFOSR/2312V11N
2312V1AA	1270.00	-----	F2AMRL93470200	AFOSR/2312V11N
2312V1AA	3095.10	-----	F2AMRL93470100	AFOSR/2312V11N
2312V1AA	6697.30	-----	Supplies/Equipment AAMRL	AFOSR/2312V11N
2312V1AA	14195.39	-----	SUPPLIES & EQUIPMENT	AFOSR/2312V11N
2312V1AA	23000.00	-----	F2AMRL93470300	AFOSR/2312V11N
2312V1AB	8143.67	-----	Reimbursed Travel Costs	AFOSR/2312V11N
FY 90 TOTAL	129,969.10	-----		

2312V118	92000.00	-----	Reimbursed Civilian Pay	AFOSR/2312V1
2312V1AA	60000.00	-----	Supplies & Equipment	AFOSR/2312V1
2312V1AB	8000.00	-----	Reimbursed Travel Costs	AFOSR/2312V1
FY 91 TOTAL	160,000.00	-----		

2312V118	128000.00	-----	Civilian Pay	AFOSR/2312V1
2312V1AA	50000.00	-----	SUPPLIES/EQUIPMENT	AFOSR/2312V1
2312V1AB	8000.00	-----	Travel Costs	AFOSR/2312V1
FY 92 TOTAL	186,000.00	-----		

2312V118	128000.00	-----	SALARY REIMBURSEMENT	AFOSR/2312V1
2312V1AA	50000.00	-----	Supplies and Equipment	AFOSR/2312V1
2312V1AB	8000.00	-----	Travel Costs	AFOSR/2312V1
FY 93 TOTAL	186,000.00	-----		

2312V118	128000.00	-----	SALARY REIMBURSEMENT	AFOSR/2312V1
2312V1AA	50000.00	-----	Supply and Equipment	AFOSR/2312V1
2312V1AB	8000.00	-----	Travel Costs	AFOSR/2312V1

FY 94 TOTAL 186,000.00

5 YEAR TOTAL 847,969.10

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90299	ABSTRACT		Jarnot, B M George, M E	Induction of Cytochrome P-450IVA1 in Male F-344 Rats by Perfluoro-N-Decanoic Acid
90131	OTHER - POSTER		Witzman, F DeRaso, N George, M	Two-Dimensional Electrophoretic Analysis of PFDA Hepatotoxicity
90038	ABSTRACT		Witzmann, F DeRaso, N George, M E	Two-Dimensional electrophoretic Analysis of PFDA Hepatotoxicity

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: PMD R-P9030(1)/6, DODI 6055.5, AFR 19-2, AFR 127-2, AFR 161-18

CUSTOMERS: USAF/SC, USAF OEHL, ASD, WRDC/PL, AFOSR

MAJOR EQUIPMENT:

FACILITIES: Building 79

Electro- and Magnetoencephalographic Indicators of Cognitive Functions

TASK MANAGER: Glenn F Wilson  
HEG - AV 785-8748

TASK NUMBER: 2313V1

OBJECTIVES:

To study the functioning of the human brain (including the processing of sensory information, cognitive activity, and behavioral responses) using magnetic and electrical recordings.

BACKGROUND:

The classical method used to study the physiological processes involved in cognitive activity in the intact human brain has been to record the associated electrical activity from a few sites on the scalp. With these procedures the spatial resolution is low and limited to midline structures. However, using larger arrays of electrodes, twenty or more, it is possible to gain a much better understanding of the spatial and temporal characteristics of brain activity associated with cognitive processing. Since the very weak electrical currents in the brain tissue generate magnetic fields, it is possible to study brain activity by monitoring these weak fields. Recent technological advances have made possible the detection of these fields using superconducting quantum interference devices (SQUID). These measurements provide much more precise spatial localization of the magnetic sources. The results of this research can be used in display design and evaluation and workload measurement.

TASK TITLE: Electro- and Magnetoencephalographic Indicators of Cognitive Functions

MIS CATEGORY: Core

MANAGER: Wilson OFFICE: HEG PHONE: 58748 START: 10-OCT-80 STOP: 31-DEC-94 PRIMARY PROGRAM ELEMENT: 61102F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	.00	.00	.00	.00	.00	.00
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	163,997.00	174,000.00	155,000.00	.00	.00	492,997.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	2,002.00	6,000.00	5,000.00	.00	.00	13,002.00
External Funding Subtotal	165,999.00	180,000.00	160,000.00	.00	.00	505,999.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 165,999.00	\$ 180,000.00	\$ 160,000.00	\$ .00	\$ .00	\$ 505,999.00
In-House Labor Hours						
Bureau (MILITARY)	1064	1064	1064			3192
Total Hours (Person-years)	1064 (.5)	1064 (.5)	1064 (.5)	(.0)	(.0)	3192

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	Electro- & Magneto-encephalographic Indicators of Cogn	Monitor	Branch	Phone	Start Date	Stop Date
2313V135	Support for Task 2313V1	Wilson	HEG	58748	15-MAR-82	30-SEP-92
2313V135	Support for Task 2313V1	Wilson	HEG	58748	01-APR-88	30-SEP-93
2313V135	AFOSR Travel Fund Tracking for Task 2313V1	Redwine Smith	HEX	58853	14-DEC-82	31-DEC-94

## \*\*\*\*\* LIST OF ACUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	Contract Number	Contract Title and Name of Contractor (if known)	Fund Source
2313V135	2997.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V1
2313V135	33600.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V1
2313V135	127400.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V1

2313V1TV	2002.00	-----	Travel Costs	AFOSR/2313V11N
FY 90 TOTAL	165,999.00			
-----				
2313V135	28000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V1
2313V135	146000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V1
2313V1TV	6000.00	-----	Travel Costs	AFOSR/2313V1
FY 91 TOTAL	180,000.00			
-----				
2313V135	155000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V1
2313V1TV	5000.00	-----	Travel Costs	AFOSR/2313V11N
FY 92 TOTAL	160,000.00			
-----				

5 YEAR TOTAL 505,999.00

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90276	A222760	TECHNICAL REPORT	Strayer, D L Kramer, A F	The Retrieval of Information from Secondary Memory: A Review and New Findings

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPLIED: Project Forecast II Technology Requirements

CUSTOMERS:

MAJOR EQUIPMENT: Neuromagnetometer, Magnetically Shielded Room

FACILITIES: Building 33 (Room 228)



Basic Research for Target Acquisition

TASK MANAGER: Mark W Cannon  
HFF - AV 785-8877

TASK NUMBER: 2513V2

OBJECTIVES:

1. To develop fundamental knowledge of mechanisms and processes that mediate target acquisition and identification.
2. To develop a computer simulation of these mechanisms and their interconnections that can produce quantitative predictions of certain aspects of human pattern perception for any visual stimulus.

BACKGROUND:

The work performed under this task addresses the transfer functions and interconnections of mechanisms responsible for contrast perception in human observers. These factors are determined from psychophysical experiments and are incorporated into a computer model of human spatial pattern perception. The model is then used to predict the results of other experiments. Failures to match human data are followed by further experiments and updates to improve model performance. The model is being used to study display image quality question techniques. The model will also be used to study camouflage and deception techniques. The model will also be used as a front end for investigations of pattern classification techniques.

## AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 2313V2

TASK TITLE: Basic Research for Target Acquisition

MIS CATEGORY: Core

MANAGER: Cannon

OFFICE: HEF

PHONE: 58877

START: 01-JAN-81

STOP: 30-SEP-96

PRIMARY PROGRAM ELEMENT: 61102F

\*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	.00	.00	.00	.00	.00	.00
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	167,417.00	168,000.00	215,000.00	.00	.00	550,417.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	2,583.00	2,000.00	5,000.00	.00	.00	9,583.00
External Funding Subtotal	170,000.00	170,000.00	220,000.00	.00	.00	560,000.00
Unfunded Requirements ( )	.00 ( )	.00 ( )	.00 ( )	.00 ( )	.00 ( )	.00 ( )
Total Annual Costs \$	170,000.00 \$	170,000.00 \$	220,000.00 \$	.00 \$	.00 \$	560,000.00
In-House Labor Hours						
Block	644	644	644	644	644	3220
Cannon	1821	1821	1821	1821	1821	9105
Total Hours (Person-Years)	2465 (1.2)	2465 (1.2)	2465 (1.2)	2465 (1.2)	2465 (1.2)	12325

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
2313V201	Basic Visual Perceptual Processes for Displays	Cannon	HEF	58877	01-JAN-81	30-SEP-96
2313V20A	Head-Coupled System Research	Haas	HEA	58893	08-SEP-86	30-SEP-91
2313V20B	Advanced Filtering Methods in Head Teleoperated Systems ands	Kocian	HEA	58904	20-JAN-88	31-DEC-92
2313V21V	AOSR Travel fund tracking for Task 2313V2	Redwine Smith	HEX	58853	14-DEC-82	31-DEC-94

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
2313V201	1417.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AOSR/2313V2
2313V201	34000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AOSR/2313V2

2313V201	132000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V2
2313V21V	2583.00	-----	Travel Costs	AFOSR/2313V2 IN
FY 90 TOTAL	170,000.00			

2313V201	1000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V2
2313V201	3000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V2
2313V201	30000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V2
2313V201	134000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V2
2313V21V	2000.00	-----	Travel Costs	AFOSR/2313V2
FY 91 TOTAL	170,000.00			

2313V201	215000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V2
2313V21V	5000.00	-----	Travel Costs	AFOSR/2313V2 IN
FY 92 TOTAL	220,000.00			

5 YEAR TOTAL	560,000.00			
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\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED:

CUSTOMERS: USAFSAM, ASD, AFVAL, AFOSR, NCV, CIE, NASA, CDE, DCIEM

MAJOR EQUIPMENT: Contact Sensitivity Measurement Equipment, Data Acquisition System, Visual Evoked Response Lab

FACILITIES: Building 248

Auditory Information Processing

TASK MANAGER: Thomas J Moore  
BBA - AV 785-3607

TASK NUMBER: 2313V3

OBJECTIVES:

1. To increase knowledge of the auditory sensory capabilities of humans and details of the neural mechanisms involved in the processing of sensory information.
2. To use this information to influence design criteria for voice communication and auditory advisory systems.

BACKGROUND:

In order to enable the human observer to be an efficient link in auditory communication systems the signals transmitted must be matched with the humans sensory capabilities. Furthermore, in examining the processing principles used by sensory systems, new and useful coding principles for use in man-made systems may be found. A description of sensory capabilities and limitations coupled with models predicting these capabilities on the bases of psychophysical and neuro-physiological data can contribute to the efficient design of man-made systems.

# AAHRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 2313V3

TASK TITLE: Auditory Information Processing

MIS CATEGORY: Core

MANAGER: Moore OFFICE: BBA PHONE: 53607 START: 01-FEB-89 STOP: 30-SEP-97 PRIMARY PROGRAM ELEMENT: 61102F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	.00	.00	.00	.00	.00	.00
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	200,000.00	89,600.00	104,000.00	.00	.00	393,600.00
Civilian Salary Costs	20,000.00	18,000.00	32,000.00	.00	.00	70,000.00
Other Support Costs	13,000.00	7,000.00	7,000.00	.00	.00	27,000.00
External Funding Subtotal	233,000.00	114,600.00	143,000.00	.00	.00	490,600.00
Unfunded Requirements	( .00 ) ( .00 ) ( .00 ) ( .00 ) ( .00 ) ( .00 )					
Total Annual Costs	\$ 233,000.00	\$ 114,600.00	\$ 143,000.00	.00	.00	\$ 490,600.00
In-House Labor Hours						
Anderson	1543	1543	1627	1627	1627	7967
Moore	635	665	770	1040	1768	4878
Slyh				520	2080	2600
Watkins	4					4
Total Hours (Person-Years)	2182 (1.0)	2208 (1.1)	2397 (1.2)	3187 (1.5)	5475 (2.6)	15449

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
2313V301	Auditory Processing	Moore	BBA	53607	01-FEB-89	01-OCT-95
2313V302	SPATIAL ORIENTATION	Repperger	BBS	55742	18-MAY-89	30-SEP-92
2313V3AA	AFOSR SUPPORT	Moore	BBA	53607	13-SEP-89	30-SEP-94
2313V3AB	BBS AFOSR SUPPORT	Albery	BBS	55742	01-MAR-91	30-SEP-97

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
2313V301	11600.00	F33615-85-C-0530	Biodynamic Engineering Support Systems Research Laboratories, Inc.	AFOSR/2313V3
2313V301	13000.00	-----	Travel Costs	AFOSR/2313V3

2313V301	F33615-89-C-0574	17000.00	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFOSR/2313V3
2313V301	-----	20000.00	Civilian Pay	AFOSR/2313V3
2313V301	F33615-89-C-0574	87400.00	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFOSR/2313V3
2313V302	F33615-89-C-0574	6555.00	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFOSR/2313V3
2313V302	F33615-85-C-0530	8400.00	Biodynamic Engineering Support Systems Research Laboratories, Inc.	AFOSR/2313V3
2313V302	F33615-89-C-0574	69045.00	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFOSR/2313V3
FY 90 TOTAL		233,000.00		

2313V301	F33615-89-C-0574	5900.00	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFOSR/2313V3
2313V301	-----	7000.00	Travel Costs	AFOSR/2313V3
2313V301	F33615-89-C-0574	7600.00	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFOSR/2313V3
2313V301	-----	18000.00	Civilian Pay	AFOSR/2313V3
2313V301	-----	45400.00	TASK ORDER 41A	AFOSR/2313V3
2313V301	F33615-89-C-0574	76100.00	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFOSR/2313V3
FY 91 TOTAL		160,000.00		

2313V301	-----	7000.00	Travel Costs	AFOSR/2313V3
2313V301	-----	32000.00	Civilian Pay	AFOSR/2313V3
2313V301	F33615-89-C-0574	104000.00	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFOSR/2313V3
FY 92 TOTAL		143,000.00		

5 YEAR TOTAL		536,000.00		
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\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90298		ABSTRACT	Bond, Z S Moore, T J	A Note on Loud and Lombard Speech
90284		PROCEEDINGS	Chelette, T L Repperger, D W Albery, W B	A Spatial Disorientation Predictor Device to Enhance Pilot Situational Awareness Regarding Aircraft
90285		ORAL PRESENTATION	Chelette, T L Repperger, D W Albery, W B	A Spatial Disorientation Predictor Device to Enhance Pilot Situational Awareness Regarding Aircraft
90181		PROCEEDINGS	Ahn, S G Westerkamp, J J	Cochlear Modeling Using a General Purpose Digital Signal Processor
90182		ORAL PRESENTATION	Ahn, S G Westerkamp, J J	Cochlear Modeling Using a General Purpose Digital Signal Processor
90065		JOURNAL ARTICLE	Bond, Z S Moore, T J	Effect of Vibration on Speech
90348		ABSTRACT	Weber, D L	Effects of Adding Frequency Differences to Temporal Patterns on Detection and Recognition
90349		ORAL PRESENTATION	Weber, D L	Effects of Adding Frequency Differences to Temporal Patterns on Detection and Recognition
90267		ORAL PRESENTATION	Slifka, J Anderson, T R	Speaker Independent Phoneme Recognition with kohonen Self-Organizing Feature Maps
90189		ABSTRACT	Anderson, T R	Speech Processing Using An Auditory Model and Neural Networks

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
IBM Systems Integration Division	Neural Network Technology	Anderson
General Dynamics Corp - Electronics Division	Neural Networks	Anderson



Crumman Corporation, Bethpage, NY

## Neural Network Applications

Anderson

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\*\* ADDITIONAL TASK INFORMATION \*\*  
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REQUIREMENTS SUPPORTED:

**CUSTOMERS:**

**MAJOR EQUIPMENT:** Hecht-Nielsen neurocomputer, 2 LISP Machines

FACILITIES: Bldg 441, Psycho Acoustics Lab

Human Performance in Complex Systems

TASK MANAGER: Maris M Vikmanis  
HEG - AV 785-7586

TASK NUMBER: 2313V4

OBJECTIVES:

1. To test the human potential for parallel processing of multiple task stimuli that occur in close temporal proximity.
2. To evaluate the viability of theoretical models of human attention that conceive of attention as a limited, sharable commodity that is divided among concurrent tasks.
3. The long-term goal of these efforts is to improve the validity of performance-based assessment of systems operators and provide guidance for the future developments of predictive models of human performance.

BACKGROUND:

There exists considerable controversy in the area of human information processing regarding the nature of human attentional processes and the role they play in the selection, analysis, and output of information in multitask situations. Two of the more important issues in this area concern the extent to which information from concurrent tasks can be processed in parallel and whether the attentional mechanism involved in dual-task processing is a limited, sharable commodity that must be divided among the tasks.

The parallel processing issue is concerned with the degree of processing that can take place on one task while attention is directed to another task. Recent literature has suggested that at least some dual-task processing can occur in parallel, but it is unclear whether the processing is deep enough to complete a semantic level analysis of the information. A major problem in the area has been the development of a valid experimental paradigm with which to address the issue. The goal in the present effort is to develop an appropriate paradigm and then delineate a cognitive model to explain the nature of parallel processing under dual-task conditions.

The second goal of this task is to evaluate the viability of limited, sharable cognitive resources as the underlying basis of human time-sharing of multiple tasks. Resource theories will be evaluated against more contemporary theoretical conceptions that base between-task interference solely on the build-up of cross-talk and outcome conflicts. These newer theories do not posit any scarcity of mental resources as necessary for explaining between-task interference. The apparent scarcity of information processing resources observed during dual-task experiments in which subjects were instructed to shift task priorities from trial to trial were the primary empirical basis for resource theory. Resources appeared to be limited because as instructions

emphasized one task the other task's performance was generally degraded. In other words, performance trade-offs were observed as a function of instructions. However, these observed performance trade-offs have been criticized as being possibly artifactual in nature. Revised instructional treatments to correct for the potential contamination have been proposed, and will be used in a variety of task environments to test the viability of resource theory. The viability of resource theory must be determined as a precursor to developing complex performance measurement procedures and performance-based workload metrics.

# AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 2313V4

TASK TITLE: Human Performance in Complex Systems

MIS CATEGORY: Core

MANAGER: Vikmanis

OFFICE: HEC

PHONE: 57586

START: 01-OCT-88

STOP: 31-DEC-94

PRIMARY PROGRAM ELEMENT: 61102F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED		FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		.00	.00	.00	.00	.00	.00
Civilian Salary Costs		.00	.00	.00	.00	.00	.00
Other Support Costs		.00	.00	.00	.00	.00	.00
Internal Funding Subtotal		.00	.00	.00	.00	.00	.00
External Funding							
Off-Site Contract Costs		.00	2,500.00	.00	.00	.00	2,500.00
On-Site Contract Costs		132,800.00	135,500.00	129,000.00	.00	.00	397,300.00
Civilian Salary Costs		.00	.00	.00	.00	.00	.00
Other Support Costs		2,200.00	2,000.00	6,000.00	.00	.00	10,200.00
External Funding Subtotal		135,000.00	140,000.00	135,000.00	.00	.00	410,000.00
Unfunded Requirements	(	.00)	.00)	.00)	.00)	.00)	.00)
Total Annual Costs	\$	135,000.00	\$ 140,000.00	\$ 135,000.00	.00	\$ 410,000.00	
In-House Labor Hours							
forester	648						648
Vidulich	663						3315
Total Hours (Person-Years)		1311 (.6)	663 (.3)	663 (.3)	663 (.3)	663 (.3)	3963

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	COGNITION IN DUAL-TASK	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
2313V401	R and I-S Performance		Skelity	HEG	58823	01-OCT-88	30-SEP-91
2313V402	SUPPORT FOR AFOSR		Vidulich	HEG	58734	03-JAN-89	30-SEP-94
2313V41P	TRAVEL		Redwine Smith	HEX	58853	11-FEB-91	31-DEC-92
2313V41V			Redwine Smith	HEX	58853	01-OCT-88	31-DEC-94

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
2313V401	3800.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V4
2313V401	10000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	AFOSR/2313V4

2313V401	F33615-89-C-0532	119000.00	Engineering Support LOGICON, Inc	AFOSR/2313V4
2313V4TV	-----	2200.00	Travel Costs	AFOSR/2313V4 IN
FY 90 TOTAL		135,000.00		

2313V401	F33615-89-C-0532	16000.00	Engineering Support LOGICON, Inc	AFOSR/2313V4
2313V401	F33615-89-C-0532	53000.00	Engineering Support LOGICON, Inc	AFOSR/2313V4
2313V402	F33615-89-C-0532	13500.00	Engineering Support LOGICON, Inc	AFOSR/2313V4
2313V402	F33615-89-C-0532	53000.00	Engineering Support LOGICON, Inc	AFOSR/2313V4
2313V4SP	F33615-87-C-0531	2500.00	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	AFOSR/2313V4
2313V4TV	-----	2000.00	Travel Costs	AFOSR/2313V4
FY 91 TOTAL		140,000.00		

2313V401	F33615-89-C-0532	64500.00	Engineering Support LOGICON, Inc	AFOSR/2313V4
2313V402	F33615-89-C-0532	64500.00	Engineering Support LOGICON, Inc	AFOSR/2313V4
2313V4TV	-----	6000.00	Travel Costs	AFOSR/2313/4 IN
FY 92 TOTAL		135,000.00		

5 YEAR TOTAL		410,000.00		
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\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90249		PROCEEDINGS	Vidulich, M A	Resources and Time-Sharing Performance: Testing the Viability of Resource Theory with Navon's Optim

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED:

CUSTOMERS: 6220.F; Performance and Workload Measurement Program /18414, Design Parameters for VCS /18411

MAJOR EQUIPMENT:

FACILITIES: Cognitive Assessment Laboratory Bldg 33

Nuclear/Biological/Chemical Operability Assessment

TASK MANAGER: Clyde R Replogle  
HET - AV 785-7583

TASK NUMBER: 272907

OBJECTIVES:

1. To develop, maintain, and operate an analysis capability to predict the impact of NBC (nuclear-biological-chemical) warfare on USAF operations.
2. To maintain a data base of all effects of chemical, biological and nuclear warfare pertinent to USAF for access by all military offices and USAF contractors.
3. To develop methodology to simulate and model USAF operations in NBC environments.
4. To perform analysis of NBC threat scenarios for the development of research and development design standards.
5. To assemble and evaluate human performance factors associated with NBC environments.
6. To conduct simulations of the effects of NBC environments on Air force operations.
7. To predict casualty rates for Air force bases.
8. To interpret hostile NBC potential, project capabilities and developments which will impact the USAF, and critique AF R&D programs against potential threats.
9. To evaluate payoff of protective equipment, policy, and procedures.

TASK TITLE: Nuclear/Biological/Chemical Operability Assessment

MIS CATEGORY: Thrust

MANAGER: Replogle

OFFICE: HET

PHONE: 57583

START: 01-OCT-82

STOP: 31-DEC-94

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	1,059,000.00	1,110,000.00	1,450,000.00	1,480,000.00	1,480,000.00	6,579,000.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	80,617.83	86,223.64	88,810.34	91,474.66	94,218.89	441,345.36
Other Support Costs	27,696.19	33,343.70	34,371.16	35,793.91	37,673.38	168,878.34
Internal Funding Subtotal	1,167,314.02	1,229,567.34	1,573,181.50	1,607,268.57	1,611,892.27	7,189,223.70
External Funding						
Off-Site Contract Costs	255,000.00	335,000.00	.00	.00	.00	590,000.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	255,000.00	335,000.00	.00	.00	.00	590,000.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 1,422,314.02	\$ 1,564,567.34	\$ 1,573,181.50	\$ 1,607,268.57	\$ 1,611,892.27	\$ 7,779,223.70
In-House Labor Hours						
Adams	1807	1807	1807	1807	1807	9035
Centers	26					26
Davis	1858	1858	1858	1858	1858	9290
Replogle	1776	1776	1776	1776	1776	8880
Total Hours (Person-years)	5467 (2.6)	5441 (2.6)	5441 (2.6)	5441 (2.6)	5441 (2.6)	27231

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
27290713	AF CW Vulnerability Analysis	Replogle	HET	57583	20-JUL-83	20-FEB-90
27290715	Chemical Warfare Model Validation	Replogle	HET	57583	01-OCT-83	30-SEP-92
27290717	COBRA	Replogle	HET	57583	17-JUL-84	30-SEP-91
27290718	AF NBC Warfare Vul Anal	Davis	HET	57583	01-APR-88	16-MAR-93
27290719	CW Defense Analysis Meth	Replogle	HET	57583	02-JAN-90	31-DEC-94
27290720	CW Hazard Mgt Analysis	Replogle	HET	57583	01-OCT-87	31-DEC-91
27290721	AF OPS in CW Environments	Replogle	HET	57583	01-OCT-87	31-DEC-91
27290730	Pressure Swing Absorption	Replogle	HET	57583	01-MAR-89	30-SEP-90
27290730	Chemical Defense Groundcrew Ensemble	Replogle	HET	57583	15-MAR-89	30-SEP-90
27290730	DISPOSABLE E/R PROT MASKS	Replogle	HET	57583	14-APR-89	30-SEP-91
27290731	CW CHALLENGE AMPHIBIOUS	Replogle	HET	57583	14-APR-89	30-SEP-91
27290730	CT WEAPONIZING EFFORT	Replogle	HET	57583	16-JUN-89	30-SEP-91
27290731	NATO NORTHERN REGION	Replogle	HET	57583	11-JUL-89	30-SEP-90
27290731	THREAT SCENARIOS FOR FSDW	Replogle	HET	57583	24-JUL-89	30-SEP-91
27290731	FSDWS TECH SUPPORT & ANALYSIS	Davis	HET	57583	25-SEP-89	30-SEP-91
27290730	DUSTY AGENT THREATS CT	Davis	HET	57583	26-FEB-90	31-DEC-92



2729073L CH STUDY AIR FORCE PERSONNEL  
 2729073M technical SUPPORT-ANBACTIS  
 2729073N AIR FORCE NBC VULNERABILITY ANALYSIS  
 272907AD DIW Analysis  
 272907TD Task Travel Support

Davis  
 Davis  
 Davis  
 Replogle  
 Redwine Smith  
 HET  
 HET  
 HET  
 HET  
 HEX  
 57583  
 57583  
 57583  
 57583  
 58853  
 06-JUN-90  
 31-DEC-91  
 08-FEB-91  
 14-MAR-91  
 08-APR-86  
 01-OCT-86  
 31-DEC-91  
 31-DEC-91  
 31-DEC-92  
 31-DEC-94

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
272907--	12696.19	----	TRAVEL EXPENSES	HSD/6106MD
272907--	80617.83	----	SALARY COSTS	HSD/6106MD
27290718	167000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	HSD/2729
27290718	292000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	HSD/2729
27290718	600000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	HSD/2729
2729073F	200000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	NAVY/NAVY
2729073K	30000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	ARMY/ARMY
2729073L	25000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	ARMY/ARMY
272907TD	15000.00	----	Mission Travel	HSD/2729

FY 90 TOTAL 1,422,314.02

272907--	13343.70	----	TRAVEL EXPENSES	HSD/6106MD
272907--	86223.64	----	SALARY COSTS	HSD/6106MD
27290718	20100.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	HSD/2729
27290718	149900.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	HSD/2729
27290718	940000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	HSD/2729
2729073M	135000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	DNA/DNA
2729073N	200000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	DOD WHS/DOD WHS

2729071D	20000.00	-----	Jaycor	
FY 91 TOTAL	1,564,567.34		Mission Travel	HSD/2729
-----				
272907--	14371.16	-----	TRAVEL EXPENSES	HSD/6106MD
272907--	88810.34	-----	SALARY COSTS	HSD/6106MD
27290718	1450000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	HSD/2729
2729071D	20000.00	-----	Travel Costs	HSD/2729
FY 92 TOTAL	1,573,181.50			
-----				
272907--	15793.91	-----	TRAVEL EXPENSES	HSD/6106MD
272907--	91474.66	-----	SALARY COSTS	HSD/6106MD
27290718	1480000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	HSD/2729
2729071D	20000.00	-----	Mission Travel	HSD/2729
FY 93 TOTAL	1,607,268.57			
-----				
272907--	17673.38	-----	TRAVEL EXPENSES	HSD/6106MD
272907--	94218.89	-----	SALARY COSTS	HSD/6106MD
27290718	1480000.00	F33615-89-C-0533	Chemical Defense R&D Priority Analysis Jaycor	HSD/2729
2729071D	20000.00	-----	Mission Travel	HSD/2729
FY 94 TOTAL	1,611,892.27			
-----				
5 YEAR TOTAL	7,779,223.70			

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

FY 90 150000.00 COST  
 TITLE: CHAS Expert System Prototype Demonstration  
 PAYOFF: Increased capabilities of a wing to operate with maximum efficiency.  
 PARTIAL COSTS:

90

250000.00 TITLE: Specific Validation Efforts

PAYOFF: High cost field data trials could be replaced by computer simulations.  
PARTIAL COSTS:

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: PMD 1065/63745F, TAF SON 310-81, CW/DD(BAR), (ICDS) Program, USAFSG(BAR)

CUSTOMERS: ASD/AESD, USAF/SA, USAF/SG, USAF/DES, DOA, DPRC, Army Chemical School

MAJOR EQUIPMENT:

FACILITIES: Building 33, Building 248

Chemical Defense Toxicology

TASK MANAGER: Bruce M Jarnot  
THB - AV 785-5150

TASK NUMBER: 272908

OBJECTIVES:

To develop a physiologically-based pharmacokinetic model for human exposure to organophosphate (OP) anticholinesterase chemical warfare (CW) agents with emphasis on low level and/or repeated OP exposure.

BACKGROUND:

A thorough knowledge of the actions of a chemical agent during entry into the body and metabolism within the body is essential to the protection and treatment of troops exposed to a chemical warfare environment. The approach involves three major components. The first is to develop a non-human mammalian model for OP exposure which can be satisfactorily validated. This model involves the mathematical framework (describing the uptake, distribution, enzyme binding, and metabolism of a test OP), development of constants identified in the model framework, and validation of the model for the test OP compound. The second component of the approach is to use the developed experimental protocols to describe and validate OP CW agent exposure in the non-human model. The final component is to scale or modify the appropriate physiological terms in the model to construct a human model for OP CW agent exposures.

TASK TITLE: Chemical Defense Toxicology

MIS CATEGORY: Thrust

MANAGER: Jarnot

OFFICE: THB

PHONE: 55150

START: 01-SEP-82

STOP: 31-MAR-92

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	266,179.00	.00	.00	.00	.00	266,179.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	266,179.00	.00	.00	.00	.00	266,179.00
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 266,179.00 \$	.00 \$	.00 \$	.00 \$	.00 \$	266,179.00
In-House Labor Hours						
Bartholomew (MILITARY)	200	100				100
Jarnot (MILITARY)	190	167				367
Jepson (MILITARY)						190
Total Hours (Person-Years)	390 (.2)	267 (.1)	(.0)	(.0)	(.0)	657

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
27290801	Mechanisms Of Chemical Agent Toxicity	Bartholomew	THB	55150	01-SEP-82	31-MAR-92
27290802	Pharmacokinetics of Chemical Agents	Jepson	THA	52704	01-JAN-86	31-DEC-90
27290804	uptake Simulant Develop	Jarnot	THB	55150	28-SEP-88	28-NOV-90
272908AA	TDY-Chem Defense	Carpenter	TH	55740	15-DEC-84	31-MAR-92
3005T102	HALOCARBON TOXICITY MODEL	Jarnot	THB	55150	09-AUG-90	16-APR-91

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
27290804	216193.00	F33615-88-C-0554	Development of Persistent Chemical Uptake Simulants Technolube Products Company	HSD/3005
3005T102	49986.00	F41622-90-C-1004	Chemical Modeling of Halocarbon Toxicity	HSD/3005

Technolube Products, Inc

FY 90 TOTAL 266,179.00

5 YEAR TOTAL 266,179.00

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90167		ORAL PRESENTATION	Gearhart, J Jepson, G	A Physiologically Based Pharmacodynamic Model for Human Exposure to Diisopropylfluorophosphate
90151		ABSTRACT	Gearhart, J Jepson, G W	A Physiologically-Based Pharmacodynamic Model for Human Exposure to Diisopropylfluorophosphate
90041		ABSTRACT	Gearhart, J M	Physiologically Based Simulation of Parathion-Paraoxon Pharmacokinetics and Pharmacodynamics
90133		OTHER - POSTER	Gearhart, J	Physiologically Based Simulation of Parathion-Paraoxon Pharmacokinetics and Pharmacodynamics

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: PMD R-P9030(1)/6, DODI 6055.5, AFR 19-2, AFR 127-2, AFR 161-18

CUSTOMERS: ASD/AESD, USAF/SC, HQ TAC, HSD/YA

MAJOR EQUIPMENT:

FACILITIES: Building 79

Voice Communications in Chemical Defense

TASK MANAGER: Joseph W Steuver  
BBA - AV 785-4244

TASK NUMBER: 272909

OBJECTIVES:

1. To identify deficiencies and weaknesses in audio communications performance of Chemical Defense (CD) protective equipment.
2. To propose changes in design and to develop specifications for Chemical Defense systems that will insure acceptable communications.
3. To develop and evaluate prototype systems to validate new design concepts.
4. To develop effective techniques for interfacing communications gear in personal protective equipment to standard voice communication links.
5. To investigate and evaluate new voice communications systems, components and concepts developed by other agencies and contractors for CD applications.

BACKGROUND:

Marginal to unacceptable voice communications are experienced with many of the present mask and ensemble systems designed to provide individuals with personal protection. Effective voice communication capability is required during nearly all phases of air and ground operations in a CD environment; efficient communications must be established among air crew, ground crew, military police, air traffic controllers, and medical personnel.

AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 272909

TASK TITLE: Voice Communications in Chemical Defense

MIS CATEGORY: Thrust

MANAGER: Steuwer OFFICE: BBA PHONE: 54244 START: 02-JAN-83 STOP: 31-DEC-92 PRIMARY PROGRAM ELEMENT: 62202F

\*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	17,289.90	7,326.25	2,144.05	.00	.00	26,760.20
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	17,289.90	7,326.25	2,144.05	.00	.00	26,760.20
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 17,289.90 \$	7,326.25 \$	2,144.05 \$	.00 \$	.00 \$	26,760.20
In-House Labor Hours						
Ericson (MILITARY)	10					10
Gillespie (MILITARY)	164	83				247
Jacobs (MILITARY)	113	113	113			339
McKinley	45	42	42			129
Nixon	24	24	24			72
Stephenson (MILITARY)	16	16	16			48
Steuwer	811	256				1067
Watkins	3					3
Total Hours (Person-Years)	1186 (.6)	534 (.3)	195 (.1)	(.0)	(.0)	1915

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONL	START DATE	STOP DATE
27290901	Chemical Defense Voice Communications	Steuwer	BBA	54244	02-JAN-83	30-SEP-92
27290902	CD Voice Communication Subjects	Steuwer	BBA	54244	22-MAR-85	31-DEC-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
272909--	17289.90	----	SALARY COSTS	HSD/6106MD



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FY 90 TOTAL	17,289.90	
-----		
272909--	7326.25	----- SALARY COSTS
FY 91 TOTAL	7,326.25	
-----		
272909--	2144.05	----- SALARY COSTS
FY 92 TOTAL	2,144.05	
-----		
5 YEAR TOTAL	26,760.20	
=====		
***** ENHANCEMENTS *****		
=====		
***** PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR *****		
=====		
***** PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES *****		
=====		
***** TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR *****		
=====		
***** TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR *****		
=====		
***** INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS *****		
=====		
***** ADDITIONAL TASK INFORMATION *****		
=====		
REQUIREMENTS SUPPORTED: PMD 1065/63745F, IAF SON 310-81, CW/DD(BAR), (ICDS) Program, USAF/SG (BAR), USAF SON 4-85 (USAF/RDPT priority list #19, July 85), Joint Service Coordination - JSA CW/CBD RD&A Plan C-A-401 & S-A-409		
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CUSTOMERS: ASD/AESD, USAF/SA, USAF/SG, HQ TAC, USACSL		
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MAJOR EQUIPMENT:		
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FACILITIES: Voice Communications Research (VOCRES) Facility, Building 441		
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Performance Assessment of Chemical Treatment Drugs

TASK MANAGER: Ronald E Yates  
HEG - AV 785-7587

TASK NUMBER: 272910

OBJECTIVES:

1. To provide support to the Joint Working Group to Determine Drug-Produced Performance Decrements in Military Performance (JWGD3).
2. To develop a performance assessment system for evaluating the effects of drugs on military performance.

BACKGROUND:

The JWGD3 is a tri-service program started by the US Army Medical Research and Development Command (MRDC) in July of 1983 to develop a performance assessment system to evaluate chemical defense treatment drugs. This information is needed to make informed decisions about the effect of chemical warfare (CW) treatment drugs on military performance capability in operational environments. The JWGD3 published a plan, titled "The Effect of Chemical Warfare Treatment Drugs on Military Performance: A Tri-Service Drug Screening program", in October 1983, which provides an extensive assessment system covering laboratory performance tests; environmental performance evaluation when subjected to heat, high altitudes, acceleration, and simulated complex environments; task analysis; operational performance models; and field validation and verification. The program is currently undergoing validation of test systems developed.

The JWGD3 is officially ending at the close of FY89. The program will continue under a new name starting in FY90. AAMRL participation will end in FY90 with delivery of final reports to MRDC.

TASK TITLE: Performance Assessment of Chemical Treatment Drugs

MIS CATEGORY: Thrust

MANAGER: Yates

OFFICE: HEG

PHONE: 57587

START: 16-MAR-84

STOP: 30-SEP-92

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	20,010.20	.00	.00	.00	.00	20,010.20
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	20,010.20	.00	.00	.00	.00	20,010.20
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 20,010.20 \$	.00 \$	.00 \$	.00 \$	.00 \$	20,010.20
In-House Labor Hours						
Mills	50					50
Vikmanis	491					491
Yates	238					238
Total Hours (Person-Years)	779 (.4)	(.0)	(.0)	(.0)	(.0)	779

\*\*\*\*\* WORK UNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	Performance Metrics	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
27291001			Yates	HEG	57587	16-MAR-84	30-SEP-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
272910--	20010.20	----	SALARY COSTS	HSD/6106MD
FY 90 TOTAL	20,010.20			

272910-- 6983.82

SALARY COSTS

HSD/6106MD

FY 91 TOTAL 6,983.82

272910-- 7193.33 ----- SALARY COSTS

HSD/6106MD

FY 92 TOTAL 7,193.33

5 YEAR TOTAL 34,187.35

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

EQUIPMENTS SUPPLIED: US Army Medical Research and Development Command Requests for Performance Assessment

CUSTOMERS: US Army Medical Research and Development Command

MAJOR EQUIPMENT: Criterion Task Set, Visually Coupled System Simulator, Visual Function Tester Psychophysiological Assessment Test System (PATS)

FACILITIES: Building 33

Engineering Support Services for the Toxic Hazards Division

TASK MANAGER: James N McDougall  
TH - AV 785-5740

TASK NUMBER: 630200

OBJECTIVES:

This task provides general engineering support services to operate and maintain facilities and equipment and to assist in-house scientific researchers in the performance of all tasks assigned to the Toxic Hazards Division. The only resources identified in the task summary sheets for this task are the resources used to manage the contracts assigned to this task or to provide general purpose support functions for Project 6302 that cannot be identified with any specific task. Products supported by the resources shown here will be listed in the summary sheets of the individual tasks with which those products are identified, even when substantial support for those products may have been provided by engineering support contracts assigned to this task.

# AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 630200

TASK TITLE: Engineering Support Services for the Toxic Hazards Division

MIS CATEGORY: Core

MANAGER: McDougall OFFICE: TH PHONE: 55740 START: 21-APR-76 STOP: 30-SEP-99 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	114,171.50	10.02	.00	.00	.00	114,181.52
Civilian Salary Costs	34,114.23	30,241.74	24,205.49	24,931.65	25,679.60	139,172.71
Other Support Costs	363,464.73	1,285,511.17	416,640.66	436,702.09	463,203.64	2,965,522.29
Internal Funding Subtotal	511,750.46	1,315,762.93	440,846.15	461,633.74	488,883.24	3,218,876.52
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	1,277,000.00	1,381,000.00	.00	.00	.00	2,658,000.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	124,000.00	90,000.00	.00	.00	.00	214,000.00
External Funding Subtotal	1,401,000.00	1,471,000.00	.00	.00	.00	2,872,000.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 1,912,750.46	\$ 2,786,762.93	\$ 440,846.15	\$ 461,633.74	\$ 488,883.24	\$ 6,090,876.52
In-House Labor Hours						
Ballingier (MILITARY)	36	553	553	553	553	36
Bishop (MILITARY)	16	40	208	485	485	2212
Cason (MILITARY)	40	485	485	485	485	16
Chase (MILITARY)	485	155	155	155	155	1258
Collier (MILITARY)	93	357	357	357	357	2425
Elves	155	244	707	707	707	93
Fisher	357	707	44	44	44	775
Freeman	244	489	508	508	508	1785
Geiger	707	504	250	250	250	488
Glasser	489	102	110	110	110	3535
Hoeflich	504	508	682	682	682	489
Jepson	44	44	302	302	302	504
Jones	102	17	17	17	17	220
Kesster	508	508	508	508	508	102
Mastanka	250	250	250	250	250	2540
Mattie	110	110	110	110	110	1250
Maynard	682	682	682	682	682	550
McDougal	296	302	302	302	302	3410
Tocco	17	17	17	17	17	1504
Willingham	347	347	347	347	347	85
Yu						347
Total Hours (Person-Years)	5482 (2.6)	4454 (2.1)	4378 (2.1)	4655 (2.2)	4655 (2.2)	23624

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
63020001	Toxic Hazards Research	McDougal	TH	55740	24-OCT-84	30-JUN-91
63020002	TOXIC HAZARDS RESEARCH	McDougal	TH	55740	06-FEB-91	15-JAN-94
63020001	Navy Contract Support	Carpenter	TH	55740	01-OCT-85	30-SEP-99
63020002	NMR1 NAVY SUPPORT	Carpenter	TH	55740	21-APR-76	31-AUG-99
6302000D	Project Travel Support	Carpenter	TH	55740	30-OCT-86	30-SEP-99
6302000TS	TH Support	Carpenter	TH	55740	30-OCT-86	30-SEP-99
630200VS	Toxic Hazards Support for Veterinary Services	Carpenter	TH	55740	01-FEB-86	30-SEP-99

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
630200--	34114.23	----	SALARY COSTS	HSD/6106MD
630200--	52617.00	----	SUPPORT COSTS	HSD/6106MD
63020001	535.00	----	F2AMRL00800400/F33601-90-	HSD/6302
63020001	4171.50	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020001	10000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6106MD
63020001	17210.00	----	F2AMRL00800400/F33601-90-	HSD/6302
630200N2	124000.00	----	JM0003 N0001000MPA025	NAVY/NAVY
630200N2	1277000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	NAVY/NAVY
630200TD	31160.10	----	Mission Travel	HSD/6302
630200TS	200.00	----	Lease/Rental of Hardware/	HSD/6302
630200TS	361.67	----	Supplies/Equipment / F2AM	HSD/6302
630200TS	500.00	----	Lease/Rental of Hardware/	HSD/6302
630200TS	897.19	----	ADPE MAINTENANCE-F7AMRL90	HSD/6302
630200TS	925.00	----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	1199.00	----	Lease/Rental of Hardware/	HSD/6302
630200TS	1390.50	----	Non-ADPE Maintenance -	HSD/6302
630200TS	2520.00	----	Lease/Rental of Hardware/	HSD/6302
630200TS	2950.00	----	Lease/Rental of Hardware/	HSD/6302
630200TS	3855.00	----	Non-ADPE Maintenance /F7A	HSD/6302

630200TS	5220.00	-----	Non-ADPE Maintenance -	HSD/6302
630200TS	6075.00	-----	Lease/Rental of Hardware/	HSD/6302
630200TS	6076.20	-----	Supplies/Equipment / AAMR	HSD/6302
630200TS	6624.00	-----	Non-ADPE Maintenance -	HSD/6302
630200TS	8640.00	-----	Non-ADPE Maintenance -	HSD/6302
630200TS	9730.07	-----	Lease/Rental of Hardware/	HSD/6302
630200TS	9929.00	-----	Non-ADPE Maintenance -	HSD/6302
630200TS	11534.00	-----	Supplies/Equipment F2AMR	HSD/6302
630200TS	12500.00	-----	Non-ADPE Maintenance -	HSD/6302
630200TS	12768.00	-----	Non-ADPE Maintenance -	HSD/6302
630200TS	17716.00	-----	ADPE MAINTENANCE - AAMR	HSD/6302
630200TS	18972.00	-----	Non-ADPE Maintenance -	HSD/6302
630200TS	21360.00	-----	Lease/Rental of Hardware/	HSD/6302
630200TS	100000.00	-----	Non-Maintenance Service C	HSD/6302
630200VS	100000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302

FY 90 TOTAL 1,912,750.46

630200--	30241.74	-----	SALARY COSTS	HSD/6106MD
630200--	98152.89	-----	SUPPORT COSTS	HSD/6106MD
630200N1	1200870.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	NAVY/NAVY
630200N2	90000.00	-----	JM0003 N0001891MPA0015	NAVY/NAVY
630200N2	180130.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	NAVY/NAVY
630200TD	40000.00	-----	Mission Travel	HSD/6302
630200TS	.00	-----	ADPE MAINTENANCE/F7AMRL00	HSD/6302
630200TS	10.02	F33615-81-C-0500	Biodynamic Engineering Support Systems Research Laboratory, Inc.	HSD/6302
630200TS	250.00	-----	Lease/Rental of Hardware/	HSD/6302
630200TS	420.00	-----	AAMRLC-90-06105, AMEND 01	HSD/6302



630200TS	500.00	-----	Software Maintenance/AAM	HSD/6302
630200TS	910.96	-----	Supplies/AAMRLB9100069/F3	HSD/6302
630200TS	936.00	-----	Supplies/AAMRLB9100069/F3	HSD/6302
630200TS	1217.50	-----	Lease/Rental of Hardware/	HSD/6302
630200TS	1530.52	-----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	1605.00	-----	AAMRLC-90-28201, AMEND 01	HSD/6302
630200TS	2024.20	-----	Lease/Rental of Hardware/	HSD/6302
630200TS	2400.00	-----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	2520.00	-----	Software Maintenance/AAMR	HSD/6302
630200TS	3218.00	-----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	3300.00	-----	Software Maintenance/AAMR	HSD/6302
630200TS	4400.00	-----	Software Maintenance/AAMR	HSD/6302
630200TS	4952.04	-----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	5562.00	-----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	5922.72	-----	Equipment/AAMRLB9100069/F	HSD/6302
630200TS	7500.00	-----	LapTop Computer/AAMRLB910	HSD/6302
630200TS	8352.00	-----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	9108.00	-----	ADPE MAINTENANCE/F7AMRL00	HSD/6302
630200TS	9414.60	-----	Software Maintenance/AAMR	HSD/6302
630200TS	9553.00	-----	Supplies/Equipment AAMRLB	HSD/6302
630200TS	9715.00	-----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	9929.00	-----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	11954.88	-----	ADPE MAINTENANCE/F7AMRL00	HSD/6302
630200TS	12500.00	-----	Non-ADPE Maintenance/F7AM	HSD/6302
630200TS	16101.00	-----	Supplies/Equipment/F2AMRL	HSD/6302
630200TS	17748.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/6302
630200TS	20316.00	-----	ADPE MAINTENANCE/F7AMRL00	HSD/6302
630200TS	20520.00	-----	Maint Contract/AAMRLC-90-	HSD/6302

630200TS	21360.00	-----	Non-ADPE Maintenance/AAMR	HSD/6302
630200TS	649337.14	-----		HSD/6302
630200VS	122280.72	-----	Svc Ktr/F6AMRL11090200/F3	HSD/6302
630200VS	150000.00	-----	Non-Maint Svc Contract/F6	HSD/6302
FY 91 TOTAL	2,786,762.93	-----		

630200--	24205.49	-----	SALARY COSTS	HSD/6106MD
630200--	202640.66	-----	SUPPORT COSTS	HSD/6106MD
630200TD	40000.00	-----	Travel Costs	HSD/6302
630200TS	174000.00	-----	Maintenance Contracts	HSD/6302
FY 92 TOTAL	440,846.15	-----		

630200--	24931.65	-----	SALARY COSTS	HSD/6106MD
630200--	222702.09	-----	SUPPORT COSTS	HSD/6106MD
630200TD	40000.00	-----	Mission Travel	HSD/6302
630200TS	174000.00	-----	Maintenance Contracts	HSD/6302
FY 93 TOTAL	461,633.74	-----		

630200--	25679.60	-----	SALARY COSTS	HSD/6106MD
630200--	249203.64	-----	SUPPORT COSTS	HSD/6106MD
630200TD	40000.00	-----	Mission Travel	HSD/6302
630200TS	174000.00	-----	Maintenance Contracts	HSD/6302
FY 94 TOTAL	488,883.24	-----		

5 YEAR TOTAL	6,307,282.25	-----		
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\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90340		JOURNAL ARTICLE	Mattie, D R Alden, C L Newell, C L Gaworski, C L	A 90-Day Continuous Vapor Inhalation Toxicity Study of JP-8 Jet Fuel
90138		OTHER-POSTER PRESENTATION	Jepson, G W Gearhart, J M	A Physiologically-Based Pharmacodynamic Model for Human Exposure to Diisopropylfluorophosphate
90279	A223158	TECHNICAL REPORT	Yerkes, K L	A Study of Mixed Convection in Large Baffled Rectangular Chambers With and Without Internal Heat Sou
90068		ABSTRACT	Wall, H G Kinkead, E R Kutzman, R S	Assessment of the Delayed Neurotoxic Potential of Organic Chemicals Used in Naval Environments
90197		OTHER - POSTER	Wall, H Kinkead, E Kutzman, R S	Assessment of the Delayed Neurotoxic Potential of Organic Chemicals Used in Naval Environments
90045		ABSTRACT	Jones, C E Hoeflich, T J Flemming, C D Kessler, J	Comparative Toxicity of Air Force Hydraulic Fluids
90130		OTHER - POSTER	Jones, C E Hoeflich, T J Flemming, C D Kessler, J	Comparative Toxicity of Air Force Hydraulic Fluids
90031		ABSTRACT	Kimmel, E Yerkes, K Carpenter, R	Design, Performance and Fluid Mechanics of a Small Animal, Whole Body Inhalation Exposure Chamber
90132		OTHER - POSTER	Kimmel, E Yerkes, K Doarn, C Carpenter, R	Design, Performance and Fluid Mechanics of a Small Animal, Whole-Body Inhalation Exposure Chamber
90093	A214779	TECHNICAL REPORT	Kinkead, E R Henry, S S Kimmel, E C Flemming, C D	Determination of the Toxicity of Cyclotriposphazene Hydraulic Fluid by 21-Day Repeated Inhalation
90273	A221927	SPECIAL REPORT	Codin, C S Wall, H G	Development of an Initiation/Promotion Assay to Detect Foci of Enzyme-Altered Hepatocytes
90321	A190413	TECHNICAL REPORT	Kinkead, E R Culpepper, B T Henry, S S Pollard, D L	Evaluation of the Acute Toxicity of Four Water-in-Oil Hydraulic Fluids
90320	A190412	TECHNICAL REPORT	Kinkead, E R Henry, S S Culpepper, B T Kutzman, R S	Evaluation of the Acute Toxicity of a Synthetic Polyalphaolefin-Based Hydraulic Fluid

90091	A214867	TECHNICAL REPORT	Kinkead, E R Culpepper, B T Wall, H G Flemming, C D	Evaluation of the Potential of Inhaled Chloropentafluorobenzene to Induce Toxicity in --344 Rats and
90039		ABSTRACT	DeRaso, N J Jones, C E Godin, C S Flemming, C	Hepatotoxicity of Halocarbon 3.1 Oil and Chlorotrifluoroethylene (CTFE) Oligomers in Male Fischer 344
90169		OTHER - POSTER	DeRaso, N J Jones, C E Mattie, D R Godin, C S	Hepatotoxicity of Halocarbon 3.1 Oil and Chlorotrifluoroethylene (CTFE) Oligomers in Male Fischer 34
90271	A221922	TECHNICAL REPORT	Kinkead, E R Bunger, S K Wolfe, R E	Irritation and Sensitization Studies on Triazine T17-2
90219		JOURNAL ARTICLE	DeRaso, N J Godin, C S Mattie, D R	Lack of Detectable Metabolism for 2, 3, 4-Trimethylpentane by Rat Kidney Proximal Tubules
90125		OTHER-POSTER PRESENTATION	Goidey, E S Fisher, J W Taylor, D H	Maternal Transfer of Hexachlorobenzene in the Rat
90186		OTHER - POSTER	Jones, C E DeRaso, N J Kinkead, E R Mattie, D R	Molecular- and Species-Specific Toxicity of Poly-CTFE, A Nonflammable Aviation Hydraulic Fluid
90137		OTHER - POSTER	Hambel, J Gearhart, J Kinkead, E	Physiologically Based Simulation of the Dermal Absorption and Kinetics of Trimethylolpropane Phosphate
90040		ABSTRACT	Hambel, J M Gearhart, J M Kinkead, E R	Physiologically Based Simulation of the Dermal Absorption and Kinetics of Trimethylolpropane Phosphate
90086	A215076	TECHNICAL REPORT	Conley, R B	Proceedings of the 17th Conference on Toxicology
90319	A191169	TECHNICAL REPORT	Gardner, D E Houston, W E Kutzman, R S	Proceedings of the Sixteenth Conference on Toxicology
90046		ABSTRACT	Ballinger, M B Jones, C E Mattie, D R DeRaso, N	Relative Non-Toxicity of Chlorotrifluoroethylene (CTFE) Oligomer in the Rhesus Monkey
90123		OTHER	Ballinger, M B Jones, C E Mattie, D R DeRaso, N	Relative Non-Toxicity of Chlorotrifluoroethylene (CTFE) Oligomer in the Rhesus Monkey
90150		ABSTRACT	Gearhart, J	Subdermal Versus Dermal Dosing in Physiologically Based

90168		OTHER - POSTER	Hambel, J Kinkead, E	Simulation of Trimethylolpropane Phosphate (
			Gearhart, J Hambel, J Kinkead, E	Subderman Versus Dermal Dosing in Physiologically Based Simulation of Trimethylolpropane Phosphate (
90087	A215176	TECHNICAL REPORT	KUTZMAN, R S CONOLLY, R B	TOXIC HAZARDS RESEARCH UNIT ANNUAL REPORT: 1938
90274	A221859	TECHNICAL REPORT	Kimmel, E C Yerkes, K L Higman, H C Kinkead, E R	The Acute Inhalation Toxicity of O,O'-Diethylmethylphosphonite Spontaneous Hydrolysis Products; O-Et
90272	A222018	TECHNICAL REPORT	Kinkead, E R Bunger, S K Wolfe, R E Wall, H G	The Acute, Delayed Neurotoxicity Evaluation of Two Jet Engine Oil Formulations
90317	A224963	TECHNICAL REPORT	Vinegar, A Winsett, D Andersen, M E Conolly, R	Use of a Physiologically Based Pharmacokinetic Model and Computer Simulation for Retrospective Asses

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: DEQPPM 81-5, AFR 19-2, DODI 6055.5, MOA AMD-318

CUSTOMERS: US Navy

MAJOR EQUIPMENT: Thomas Domes

FACILITIES: Building 79, Building 433

NOTE: This task summary covers only administrative and support costs for an Operations and Maintenance contract that supports the entire project. Specific funding and products are listed under the individual workunits that supply funding to the contract.

Toxicology of Aerospace Chemicals and Materials

TASK MANAGER: Donald R Tocco  
THB - AV 785-5150

TASK NUMBER: 630201

OBJECTIVES:

To define human tolerances and occupational hazards associated with new chemicals and materials used to support Air Force weapon systems.

BACKGROUND:

Improved hydraulic fluids, sealants, coatings, and structural materials are continually under study to replace those used in currently deployed aircraft and missile systems. Since the health hazards may be an important factor in the cost of manufacturing, as well as using and disposing of these chemicals under new federal regulations, it is imperative that their toxicity be determined before acquisition decisions are made.

TASK TITLE: Toxicology of Aerospace Chemicals and Materials

MIS CATEGORY: Thrust

MANAGER: Tocco OFFICE: THB PHONE: 55150 START: 01-SEP-61 STIOP: 31-DEC-96 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	94,760.00	222,240.00	.00	.00	.00	317,000.00
On-Site Contract Costs	1,065,794.00	700,200.00	1,269,000.00	159,000.00	140,000.00	3,333,994.00
Civilian Salary Costs	54,614.70	33,752.73	3,369.06	3,470.14	3,574.24	98,780.87
Other Support Costs	176,818.96	96,880.09	104,339.85	114,669.50	128,315.17	621,023.57
Internal Funding Subtotal	1,391,987.66	1,053,072.82	1,376,708.91	277,139.64	271,889.41	4,370,798.44
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 1,391,987.66	\$ 1,053,072.82	\$ 1,376,708.91	\$ 277,139.64	\$ 271,889.41	\$ 4,370,798.44
In-House Labor Hours						
Ballinger (MILITARY)	36					36
Bartholomew (MILITARY)	247	247	247	247	247	1235
Bishop (MILITARY)		839	839	839	839	3356
Cason (MILITARY)	326					326
Chase (MILITARY)	1241	1241	416	624	624	4146
DeRaso (MILITARY)	61	183	183	183	183	793
Elves (MILITARY)	652					652
Geiger (MILITARY)	1373					2094
George (MILITARY)	68					136
Haddad (MILITARY)	390					780
Hoeflich (MILITARY)	646					646
Hoover (MILITARY)	856					960
Jones (MILITARY)	533					533
Kessler (MILITARY)	1052					4588
Maslanka (MILITARY)	785					1353
Mattie (MILITARY)	766					1138
Maynard (MILITARY)	803					4015
McDougal (MILITARY)	24					120
Pressley (MILITARY)	896					896
Tocco (MILITARY)	1294					4170
Young						
Total Hours (Person-Years)	12049 (5.8)	6908 (3.3)	4200 (2.0)	4408 (2.1)	4408 (2.1)	31973

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	HAZMAT IDENTIFICATION SYSTEM	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
3005T101	HAZAD WATER IDENTIFICATION SYSTEM		Mattie	THA	52704	10-AUG-89	10-FEB-90
3005T201	Toxicologic Screening Of Toxic Chem & Mater Used In AF Oper		Yu	THA	52704	15-MAR-91	15-MAR-93
63020104	Consultation On Toxic Health Effects		Mattie	THA	52704	01-SEP-61	30-SEP-95
63020149	Toxicology Of Aerospace Structural Composites		Elves	TH	52631	01-APR-74	30-SEP-91
63020158	Toxicology Of New Hydraulic Fluid		Mattie	THA	52704	01-FEB-82	30-MAR-92
63020169	New Methods in Combustion Toxicology		Mattie	THA	52704	01-JUL-88	15-FEB-90
63020170	Toxicology of CTFE		Tocco	THB	55150	01-JUN-88	31-OCT-91
63020171	Toxicology of High Energy Propellants		Tocco	THB	55150	16-FEB-90	15-AUG-95
63020172	TOXICOLOGY OF HYDROCARBON-INDUCED NEPHROPATHY		Mattie	THA	52704	01-APR-89	30-SEP-95
63020173	TOXIC SCREENING OF AIR FORCE CHEMICALS		Mattie	THA	52704	01-JUN-89	31-MAR-92
63020174	TOXICOLOGY OF HALON REPLACEMENTS		Tocco	THB	55150	16-AUG-90	30-SEP-95
63020175	AAMRL CLIN Path Support		McDougal	TH	55740	19-NOV-90	31-DEC-96
630201CP	Tech Photo/Fabrication		Carpenter	TH	55740	01-JUN-88	30-SEP-95
630201TW			Carpenter	TH	55740	01-OCT-87	30-SEP-95

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005T101	50000.00	F41622-89-C-1029	Hazmat Identification Decision System Operational Technologies Corp.	HSD/3005
3005T201	44760.00	F41624-91-C-6000	Dev of A Prototype Decision Spt Sys for Hazardous Matl ID & Mgmt Operational Technologies Corp	HSD/3005
630201--	54614.70	----	SALARY COSTS	HSD/6106MD
630201--	92178.96	----	SUPPORT COSTS	HSD/6106MD
63020104	15794.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020104	150000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020158	50000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020169	250000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020169	350000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020170	50000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020172	200000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
630201CP	84640.00	----	F2AMRL93460100/F3360190FD	HSD/6302

FY 90 TOTAL 1,391,987.66



30051201	22240.00	F41624-91-C-6000	Dev of A Prototype Decision Spt Sys for Hazardous Matl ID & Mgmt Operational Technologies Corp	HSD/3005
30051201	200000.00	F41624-91-C-6000	Dev of A Prototype Decision Spt Sys for Hazardous Matl ID & Mgmt Operational Technologies Corp	HSD/3005
630201--	33752.73	----	SALARY COSTS	HSD/6106MD
630201--	96880.09	----	SUPPORT COSTS	HSD/6106MD
63020171	13050.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020171	87000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020174	26100.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020174	174000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020174	300000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020175	13050.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020175	87000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
FY 91 TOTAL	1,053,072.82			
630201--	3369.06	----	SALARY COSTS	HSD/6106MD
630201--	104339.85	----	SUPPORT COSTS	HSD/6106MD
63020104	1124000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020170	145000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
FY 92 TOTAL	1,376,708.91			
630201--	3470.14	----	SALARY COSTS	HSD/6106MD
630201--	114669.50	----	SUPPORT COSTS	HSD/6106MD
63020104	.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020170	159000.00	F33615-90-C-0532	Toxic Hazards Research	HSD/6302

NSI Technology Services Corp.

FY 93 TOTAL 277,139.64

630201--	3574.24	----	SALARY COSTS	HSD/6106MD
630201--	128315.17	----	SUPPORT COSTS	HSD/6106MD
63020104	.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020170	140000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302

FY 94 TOTAL 271,889.41

5 YEAR TOTAL 4,370,798.44

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90001		ABSTRACT	Mattie, D R Clewett, I J, H J Andersen, M E	A Pragmatic Risk Assessment of CTFE Oligomers
90144		ORAL PRESENTATION	Mattie, D R Clewett, H J Andersen, M E	A Pragmatic Risk Assessment of CTFE Oligomers
90069		ABSTRACT	Tocco, D R Forrest, V J Geiger, D L Carpenter, R L	Acute Toxicity of Carbon Composite Products
90287		ABSTRACT	Elves, R Forrest, V F Geiger, D Tocco, D R	Combustion Toxicity of Halon Replacements
90043		ABSTRACT	Vinegar, A Seckel, C Jones, C Ballinger, M	Computer Simulation of Chlorotrifluoroethylene Oligomer (CTFE) Pharmacokinetics in Male Rhesus Monke
90122		OTHER	Vinegar, A Seckel, C Jones, C	Computer Simulation of Chlorotrifluoroethylene Oligomer (CTFE) Pharmacokinetics in Male Rhesus Monke

90104	JOURNAL ARTICLE	Ballinger, M Kutzman, R S Clewett, H J	Conference on Occupational Health Aspects of Advanced Composite Technology in the Aerospace Industry
90070	ORAL PRESENTATION	Ballinger, M B	End Users Concerns for the Health Safety and Environment
90037	ABSTRACT	Elves, R G Alvares, A P	Ethanol Effects on Acetylation Polymorphism
90127	OTHER-POSTER PRESENTATION	Elves, R G Alvares, A P	Ethanol Effects on Acetylation Polymorphism
90094	TECHNICAL REPORT	Kinkead, E R Bunger, S K Wolfe, R E Doarn, C R	Evaluation of the Acute Toxicity of Silahydrocarbon
90148	ABSTRACT	Vinegar, A Seckel, C S Jones, C E Ballinger, M B	Extrapolation from Inhalation Exposure of Rodents to Oral Dosing of Primates: Computer Simulation o
90165	OTHER - POSTER	Vinegar, A Seckel, C Jones, C Ballinger, M B	Extrapolation from Inhalation Exposure of Rodents to Oral Dosing of Primates: Computer Simulation o
90166	ORAL PRESENTATION	Vinegar, A Seckel, C S Jones, C E Ballinger, M B	Extrapolation from Inhalation Exposure of Rodents to Oral Dosing of Primates: Computer Simulation of
90136	OTHER - POSTER	Kinkead, E R Wall, H G Godin, C S Whitmire, R E	Inhalation Studies of 3.1 Oil for Determination of a No-Effect Level
90042	ABSTRACT	Godin, C S Wall, H G DeRaso, N J Kinkead, E R	Mechanism of Liver Weight Increase Following Exposure to Halocarbon 3.1 Oil
90134	OTHER - POSTER	Godin, C Wall, H Kinkead, E DeRaso, N	Mechanism of Liver Weight Increase Following Exposure to Halocarbon 3.1 Oil
90115	ABSTRACT	Jones, C E DeRaso, N J Mattie, D R	Molecular- and Species-Specific Toxicity of Polychlorotrifluoro-Ethylene (Poly-CFTE), A Nonflammable
90157	OTHER - POSTER	Elves, R G	Recommended Threshold Limit Value for N-methyl-2-pyrrolidone
90074	ABSTRACT	Mattie, D R Clewett, H J Andersen, M E	Risk Assessment of CITE 3.1 Oil Hydraulic Fluid

90159	OTHER-POSTER	Mattie, D R Clewell, H J Andersen, M E	Risk Assessment of CTFE 3.1 Oil Hydraulic Fluid												
90330	ABSTRACT	Wolfe, R E Bunger, S K Leahy, H F Kinkead, E R	Temperature Hydraulic Fluid												
90053	DRAFT IR	Mattie, D R Maslanka, J J DeRaso, N J Chase, M R	The Effect of 2,3,4-trimethylpentane on the Ultrastructure of Proximal Tubular Cells in Primary Cell												
90170	OTHER - POSTER	Serve, M P Roberts, J McDonald, G A Parnell, M J	The Metabolism of Ethylcyclohexane in Fisher 344 Rats												
90002	ORAL PRESENTATION	Mattie, D R	Toxicological Studies of CTFE Hydraulic Fluid												
90212	ABSTRACT	Mattie, D R Maslanka, J J Chase, M R	Ultrastructural Study of the Effect of PolyCTFE on Primate Liver												
90325	TECHNICAL REPORT	Mattie, D R Maslanka, J J Chase, M R	Ultrastructural Study of the Effect of Polycyctfe on Primate Liver												
***** PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES *****															
***** TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR *****															
***** TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR *****															
***** INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS *****															
<table border="1"> <thead> <tr> <th>COMPANY</th> <th>IRAD TOPIC</th> <th>EVALUATOR</th> </tr> </thead> <tbody> <tr> <td>Battelle</td> <td>Environmental Chemistry Methods Development</td> <td>Elves</td> </tr> <tr> <td>Battelle</td> <td>Safety and Efficacy Evaluation Methods</td> <td>Elves</td> </tr> <tr> <td>Battelle</td> <td>Novel Evaluation Methods for Bioactive Chemicals</td> <td>Elves</td> </tr> </tbody> </table>				COMPANY	IRAD TOPIC	EVALUATOR	Battelle	Environmental Chemistry Methods Development	Elves	Battelle	Safety and Efficacy Evaluation Methods	Elves	Battelle	Novel Evaluation Methods for Bioactive Chemicals	Elves
COMPANY	IRAD TOPIC	EVALUATOR													
Battelle	Environmental Chemistry Methods Development	Elves													
Battelle	Safety and Efficacy Evaluation Methods	Elves													
Battelle	Novel Evaluation Methods for Bioactive Chemicals	Elves													
***** ADDITIONAL TASK INFORMATION *****															

REQUIREMENTS SUPPORTED: PMR R--9030(1)/6, DODI 6055.5, AFR 19-2, AFR 127-12, AFR 161-18

CUSTOMERS: US NavJ, WRDC, ASD/YP, SD, US Army, DOT, USAF SG, AFOEHL, MAJCOMs

MAJOR EQUIPMENT: Thomas Domes, FAA-Style Chamber, Cell-Culture Equipment, Transmission and Scanning Electron Microscopes

FACILITIES: Building 79, Toxic Hazards Research Unit, Necropsy Room

Toxicokinetics and Pharmacodynamics of Air Force Chemicals

TASK MANAGER: Marilyn E George  
THB - AV 785-5150

TASK NUMBER: 630202

OBJECTIVE

To integrate physiological, biochemical, and pharmacological processes into coherent and comprehensive mathematical descriptions of the effects Air Force chemicals produce in mammalian systems.

BACKGROUND:

With most toxic chemicals it is clearly unethical to study toxicity in human subjects, and risk management decision for toxic chemicals of Air Force interest are often based solely on toxicity studies in animals.

Physiologically-based toxicokinetic and pharmacodynamic models are particularly useful in supporting extrapolation of animal toxicity results to predict human risk. In this usage, toxicokinetics is the study of the absorption, distribution, metabolism, and elimination of toxic chemicals, while pharmacodynamics is the study of the physiological and pathological changes caused by these chemicals.

These physiologically-based mathematical models are also useful in predicting experimental results through the process of computer simulation. In this way validated physiologically-based models can be used to optimize experimental design and dose selection, thereby greatly reducing the numbers of living animals required for toxicity testing studies. The overall goal of research in this task is to use these quantitative mathematical models to provide a rational, scientific basis for human risk assessment and to refine these models sufficiently that they can be used in standard-setting activities for chemicals of Air Force interest.

TASK TITLE: Toxicokinetics and Pharmacodynamics of Air Force Chemicals

MIS CATEGORY: Core

MANAGER: George OFFICE: THB PHONE: 55150 START: 01-SEP-61 STOP: 30-SEP-95 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED		FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		550,000.00	800,100.00	590,000.00	610,000.00	595,000.00	3,145,100.00
Civilian Salary Costs		53,450.20	68,707.88	81,647.88	84,097.32	86,620.24	374,523.52
Other Support Costs		77,619.93	62,055.75	62,229.87	68,390.63	76,529.11	346,825.29
Internal Funding Subtotal		681,070.13	930,863.63	733,877.75	762,487.95	758,149.35	3,866,448.81
External Funding							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		.00	.00	.00	.00	.00	.00
Civilian Salary Costs		.00	.00	.00	.00	.00	.00
Other Support Costs		.00	.00	.00	.00	.00	.00
External Funding Subtotal		.00	.00	.00	.00	.00	.00
Unfunded Requirements	( )	( .00 )	( .00 )	( .00 )	( .00 )	( .00 )	( .00 )
Total Annual Costs	\$	681,070.13	930,863.63	733,877.75	762,487.95	758,149.35	3,866,448.81
In-House Labor Hours							
Cason (MILITARY)		562					562
Chase (MILITARY)		176	176	485			837
DelRaso		1033	911	911	911	911	4677
Dunovant (MILITARY)			624	624	624	624	2496
Fazekas (MILITARY)		64					64
George (MILITARY)		676	455	523	523	523	2700
Haddad		5	5	5			15
Harvey (MILITARY)		475	624	624	624	624	2971
Hoeflich (MILITARY)		144					144
Jarnot (MILITARY)		104					104
Kessler (MILITARY)		40					40
Maslanka (MILITARY)		88	88	88			264
Mattie (MILITARY)		633	1205	1577	1577	1577	6569
Nichols (MILITARY)		968					968
Schmidt (MILITARY)			645	645	645	645	2580
Walsh (MILITARY)		1743	1743	1743	1743	1743	8715
Whittaker (MILITARY)		159	44				203
Total Hours (Person-Years)		6870 (3.3)	6776 (3.3)	7481 (3.6)	6903 (3.3)	6903 (3.3)	34933

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

## WORKUNIT TITLE

63020218 Analysis & Modeling of Routes Of Absorption Of repr Compound  
63020219 TEM and Permeability Changes Resulting from Dermal Exposure  
63020220 Pharmacodynamics of Carcinogenesis

## MONITOR

Fisher  
Mattie  
George

## BRANCH

TH  
THA  
THB

## PHONE

55740  
52704  
55150

## START DATE

01-OCT-82  
21-NOV-85  
15-JAN-87

## STOP DATE

30-APR-92  
30-JUN-92  
30-SEP-91

63020222 Development of Strategy for Tiered Approach  
63020223 Development of Predictive Toxicological Techniques  
63020224 HEALTH EFFECTS TOOL DEVELOPMENT  
63020202 LACTATION MODEL

Jarnot THB 55150 30-APR-88 30-SEP-92  
DeRaso THB 55150 01-MAY-90 30-SEP-95  
McDougal TH 55740 19-NOV-90 30-SEP-95  
Fisher TH 55740 04-NOV-88 31-DEC-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
630202--	53450.20	----	SALARY COSTS	HSD/6106MD
630202--	54976.93	----	SUPPORT COSTS	HSD/6106MD
63020218	100000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020219	150000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020220	250000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020222	50000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020223	22643.00	----	AF FORM 616 HY90-39 to AF	HSD/6302
FY 90 TOTAL	681,070.13			

630202--	57780.75	----	SUPPORT COSTS	HSD/6106MD
630202--	68707.88	----	SALARY COSTS	HSD/6106MD
63020218	13050.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020218	87000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020218	100000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020219	4275.00	----	Supplies/Equipment-F2AMRL	HSD/6302
63020220	200000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020222	100000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302
63020223	200000.00	F33615-85-C-0532	Toxic Hazards Research NSI Technology Services Corporation	HSD/6302



63020224	13050.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020224	87000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
FY 91 TOTAL	930,863.63			
630202--	62229.87	-----	SUPPORT COSTS	HSD/6106MD
630202--	81647.88	-----	SALARY COSTS	HSD/6106MD
63020218	300000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020220	145000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020223	145000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
FY 92 TOTAL	733,877.75			
630202--	68390.63	-----	SUPPORT COSTS	HSD/6106MD
630202--	84097.32	-----	SALARY COSTS	HSD/6106MD
63020218	310000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020220	155000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020223	145000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
FY 93 TOTAL	762,487.95			
630202--	76529.11	-----	SUPPORT COSTS	HSD/6106MD
630202--	86620.24	-----	SALARY COSTS	HSD/6106MD
63020218	315000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020220	140000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
63020223	140000.00	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302

FY 94 TOTAL 758,149.35

5 YEAR TOTAL 3,866,448.81

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90032		ABSTRACT	Reitz, R H Corley, R A Mendrala, A L Quast, J F	A PB-PK Risk Assessment for Chloroform
90326	A225319	TECHNICAL REPORT	Shelley, M L Andersen, M E Fisher, J W	A Risk Assessment Approach for Nursing Infants Exposed to Volatile Organics through the Mother's Occ
90307		PROCEEDINGS	McDougal, J N	Dermal to Inhalation Extrapolation for Organic Chemicals
90327	A225171	TECHNICAL REPORT	Gargas, M L Andersen, M E	Determining Kinetic Constants of Chlorinated Ethane Metabolism in the Rat from Rates of Exhalation
90026		ABSTRACT	Goldey, E S Fisher, J W Taylor, D H	Material Transfer of Hexachlorobenzene in the Rat

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: DODI 6055.5, AFR 19-2, AFR 127-12, AFR 161-18

CUSTOMERS: USAF/SC, USAF/OEHL, ASD, AFWAL/PL

MAJOR EQUIPMENT:

-----  
FACILITIES: Building 79  
-----

Toxicology of High Energy Fuels

TASK MANAGER: David R Matti;  
THA - AV 735-2704

TASK NUMBER: 630208

OBJECTIVES:

To establish the degree of hazard associated with high energy fuels and propellants used in Air Force operations and to establish safe human tolerance limits for their use.

BACKGROUND:

Studies encompass not only inhalation exposures of short, medium, and long duration, but also other routes of exposure (e.g., oral, dermal, or eye) that may occur in typical military use. Current research is focused on solid rocket, cruise missile, Space Shuttle, and strategic missile fuels.

TASK TITLE: Toxicology of High Energy fuels

MIS CATEGORY: Thrust

MANAGER: Mattie

OFFICE: THA

PHONE: 52704

START: 04-JAN-82

STOP: 30-SEP-95

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	3,736.30	.00	.00	.00	.00	3,736.30
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	3,736.30	.00	.00	.00	.00	3,736.30
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 3,736.30 \$	.00 \$	.00 \$	.00 \$	.00 \$	\$ 3,736.30
In-House Labor Hours						
Chase (MILITARY)	46					46
Haddad (MILITARY)	33					33
Maslanka (MILITARY)	28					28
Mattie	179					179
Total Hours (Person-Years)	286 (.1)	(.0)	(.0)	(.0)	(.0)	286

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
63020804	Chronic Toxicology Of Hydrazine Strategic Missile Fuels	Whitmire	THV	55711	04-JAN-82	01-MAR-91
63020807	Toxicology of High Energy Propellants	Mattie	THA	52704	15-JAN-87	30-SEP-95
63020801	Mechanisms of Hydrocarbon Nephropathy	Parnell	THB	55257	01-OCT-86	30-SEP-92

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
630208--	3736.30	----	SALARY COSTS	HSD/6106MD
FY 90 TOTAL	3,736.30			

5 YEAR TOTAL 3,736.30

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: AMD 9030/63215F, USAF SON 1-81

CUSTOMERS: USAF/LEE, AFESC/DEV, AFMIL/PL, USAF/SG, SAC, MAJCONS, SD

MAJOR EQUIPMENT: Thomas Domes

FACILITIES: Building 79, Toxic Hazard Research Unit

Installation Restoration Program

TASK MANAGER: Gary W Jepson  
THA - AV 785-2704

TASK NUMBER: 630213

OBJECTIVES:

1. To provide toxicology information on hazardous chemicals identified in the Installation Restoration Program (IRP).
2. To develop risk assessment methods leading to scientifically based decisions for target clean-up levels, particularly where drinking water contamination is concerned.

BACKGROUND:

1. The Defense Environmental Quality Program Policy Memorandum, "DOD Installation Restoration Program", defines a comprehensive program to identify and evaluate hazardous material disposal sites on DoD installations and to control the migration of environmental contamination from such sites.
2. The USAF program implementing this DOD directive, managed and funded through HQ USAF/LEEV, is conducted in several phases from initial identification of a potential problem site to major contract site restoration projects. Our involvement is primarily with the research and development phase which seeks to develop optimum technologies for cost effective restoration procedures.

TASK TITLE: Installation Restoration Program

MIS CATEGORY: Thrust

MANAGER: Jepson

OFFICE: THA

PHONE: 52704

START: 25-NOV-85

STOP: 30-SEP-97

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	9,222.00	.00	.00	.00	9,222.00
On-Site Contract Costs	.00	61,478.00	200,000.00	200,000.00	218,000.00	679,478.00
Civilian Salary Costs	71,581.30	44,805.52	46,149.69	47,534.18	48,960.21	259,030.90
Other Support Costs	14,812.00	5,858.27	6,309.36	6,933.99	7,759.13	41,673.35
Internal Funding Subtotal	86,393.30	121,363.79	252,459.05	254,468.17	274,719.34	989,404.25
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 86,393.90	\$ 121,363.79	\$ 252,459.05	\$ 254,468.17	\$ 274,719.34	\$ 989,404.25
In-House Labor Hours						
Bartholomew (MILITARY)	686	684	684	684	684	686
Bates (MILITARY)	559					3295
Burgess (MILITARY)	543					543
Cason (MILITARY)						
Channel (MILITARY)	320	152	152	152	152	928
Fisher (MILITARY)	1659	400	400	400	400	3259
Geiger (MILITARY)						
Haddad (MILITARY)	203	104	104	104	104	203
Hancock (MILITARY)	1680					2096
Hinga (MILITARY)	12					12
Hoover (MILITARY)						
Jepson (MILITARY)	1305	1212	1316	1316	1316	5160
Kessler (MILITARY)		1000	1000	1000	1000	5305
Pressley (MILITARY)	925	1333	1333	1333	1333	6257
Tocco (MILITARY)						
Whittaker (MILITARY)	412					412
Yu	1681	1473	1473	1473	1473	7573
Total Hours (Person-Years)	9985 (4.8)	6358 (3.1)	6462 (3.1)	6462 (3.1)	6462 (3.1)	35729

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT WORKUNIT TITLE

63021301 Toxicology Guide to Air Force IRP Chemicals

63021302 Toxicokinetic Modeling of Air Force IRP Chemicals

63021303 Risk Assessment of Air Force IRP Chemicals

MONITOR START DATE STOP DATE

Jepson 01-JAN-86 31-MAR-90

Yu 01-JAN-86 30-SEP-97

Haddad 25-NOV-85 07-MAR-91



63021304	Toxicology of IRP Chemicals	Yu	THA	52704	01-JAN-86	31-MAR-90
63021306	Toxicity Test - Installation Restoration Program Chemicals	Tocco	THB	55150	15-MAY-87	31-MAR-92
63021307	AF TOX GUIDE UPDATE	Jepson	THA	52704	01-SEP-87	31-MAR-90
63021308	Cancer Risk Assessment Me	Gargas	THB	55150	29-SEP-89	04-JUN-92
63021309	RISK ASSESSMENT METHODS	Hingra	THA	55711	01-MAR-89	30-SEP-95
63021310	DEV OF EPTC CANCER MODELS	Gargas	THB	55150	01-MAR-89	15-AUG-90
63021311	PARAMETERS FOR INTE MODEL	Jepson	THA	52704	01-MAR-89	30-SEP-95
63021312	Medaka Fish Cancer Model	Fisher	TH	55740	01-MAY-89	30-SEP-92
63021313	Installation Restoration Program Travel	Carpenter	TH	55740	15-MAY-87	31-DEC-91

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

63021304	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
63021304	-----	SUPPORT COSTS	HSD/6106MD
63021304	-----	SALARY COSTS	HSD/6106MD
63021304	-----	Supplies/Equipment F2AMRI	HSD/6302
63021304	-----	Supplies/Equipment F2AMRI	HSD/6302
FY 90 TOTAL	86,393.90		

63021304	-----	SUPPORT COSTS	HSD/6106MD
63021304	-----	SALARY COSTS	HSD/6106MD
63021305	F33615-90-C-0532	CW Defense Analysis Methodology NSI Technology Services Corp.	HSD/6302
63021305	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
FY 91 TOTAL	172,051.07		

63021304	-----	SUPPORT COSTS	HSD/6106MD
63021304	-----	SALARY COSTS	HSD/6106MD
63021302	F33615-90-C-0532	Toxic Hazards Research NSI Technology Services Corp.	HSD/6302
FY 92 TOTAL	286,112.99		

63021304	-----	SUPPORT COSTS	HSD/6106MD
63021304	-----	SALARY COSTS	HSD/6106MD

63021302 200000.00 F33615-90-C-0532 Toxic Hazards Research  
NSI Technology Services Corp.

HSD/6302

FY 93 TOTAL 289,131.73

630213-- 7759.13 ---- SUPPORT COSTS HSD/6106MD  
630213-- 84663.68 ---- SALARY COSTS HSD/6106MD  
63021302 218000.00 F33615-90-C-0532 Toxic Hazards Research HSD/6302  
NSI Technology Services Corp.

FY 94 TOTAL 310,422.81

5 YEAR TOTAL 1,144,112.50

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90142		ABSTRACT	DeSesso, J Mavis, R	A Comparison of Dimensions and Surface Areas of the Absorptive Regions in the Gastrointestinal Tract
90163		OTHER - POSTER	Fisher, J W Jepson, G W	Effect of Vehicle on the Gastrointestinal Absorption of Trichloroethylene
90145		ABSTRACT	Fisher, J W Jepson, G W	Effect of Vehicle on the Gastrointestinal Absorption of Trichloroethylene
90098		DRAFT TR	DeSesso, J Mavis, R	Identification of Critical Biological Parameters Affecting Gastrointestinal Absorption
90044		ABSTRACT	Fisher, J W Gargas, M L Andersen, M E	Metabolism of Trichloroethylene in Male and Female B6C3F1 Mice
90135		OTHER-POSTER PRESENTATION	Fisher, J W Gargas, M L Andersen, M E	Metabolism of Trichloroethylene in Male and Female B6C3F1 Mice
90027		ABSTRACT	Fisher, J Allen, B Shipp, A Andersen, M	Pharmacokinetic Modeling of Trichloroethylene Relevant to Its Hepatocarcinogenicity
90124		ORAL PRESENTATION	Allen, B Fisher, J Shipp, A	Pharmacokinetic Modeling of Trichloroethylene Relevant to Its Hepatocarcinogenicity

90222	ORAL PRESENTATION	Andersen, M	Pharmacokinetics of Trichloroethylene/Trichloroacetic Acid for Use in Cancer Risk Assessment
90302	ABSTRACT	Allen, B C Fisher, J W Shipp, A M Andersen, M E	Risk Analysis of Chronic Exposure to Trichloroethylene Using a Physiological Model
90028	OTHER - GUIDE	Fisher, J W	The Installation Restoration Program Toxicology Guide
90022	ABSTRACT	Lu, P Y Young, R A Francis, R W Fisher, J W	Toxicology Guide for Installation Restoration Program Application
90126	OTHER-POSTER PRESENTATION	Lu, P Y Young, R A Francis, M W Fisher, J W	Toxicology Guide for Installation Restoration Program Application

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

CUSTOMERS

DESCRIPTION OF TECHNOLOGY TRANSITIONED

HQ USAF/SGPA, HQ USAF/LEEV, All Base Installation Restoration Program Toxicology Guide, Additional Volume  
Environ. Mgmt Offices

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: Defense Environmental Quality Control Program Policy Memorandum (DEQPPM) 81-5

CUSTOMERS: Defense Environmental Restoration Program, HQ USAF/SGPA, HQ USAF/LEEV, EPA Health Effects Research Laboratory

MAJOR EQUIPMENT:

FACILITIES: Building 79 (Room 185)

Toxicology in the Operational Environment

TASK MANAGER: KYUNG OH YU  
THA - AV 785-2704

TASK NUMBER: 630214

OBJECTIVES:

1. To provide data and methodology for more accurate assessment of chemical hazards in Air Force operations. Examples include establishing threshold limit values for dermal vapor exposure of hydrazine fuels and assessing the potential impact of occupational exposure of women to chemicals. Health risk to USAF personnel due to accidental release of triethylborane (TEB) during operations will also be determined.
2. To report new findings and methodology development in handbooks, technical reports and open literature.
3. To provide more accurate risk assessment of hazardous chemicals and fuels. This will result in enhanced personnel safety and greater operational efficiency.

BACKGROUND:

USAF needs guidelines to set proper limits for the chemicals used in the Air Force working environment and to identify indices of human exposure to hazardous chemicals. This task will provide the information necessary to develop these guidelines. This task will initially incorporate the ongoing workunits 63020804, 63020805, 63020809 and two additional new workunits.

TASK TITLE: Toxicology in the Operational Environment

MIS CATEGORY: Thrust

MANAGER: Yu OFFICE: THA PHONE: 52704

START: 01-APR-89 STOP: 30-SEP-95 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	200,000.00	.00	.00	.00	.00	200,000.00
Civilian Salary Costs	.00	20,908.92	21,536.19	22,182.28	22,847.74	87,475.13
Other Support Costs	.00	102,126.50	.00	.00	.00	102,126.50
Internal Funding Subtotal	200,000.00	123,035.42	21,536.19	22,182.28	22,847.74	389,601.63
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 200,000.00	\$ 123,035.42	\$ 21,536.19	\$ 22,182.28	\$ 22,847.74	\$ 389,601.63
In-House Labor Hours						
Channel	1728	1728	1728	1728	1728	6912
Hancock	1576	1576	1576	1576	1576	6304
Harvey	1202	1202	1202	1202	1202	4808
Total Hours (Person-Years)	(.0)	4506 (2.2)	4506 (2.2)	4506 (2.2)	4506 (2.2)	18024

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
63021402	Dermal Hazards of Hydrazines	McDougal	TH	55740	01-APR-89	30-SEP-95
63021403	Toxicity Evaluation of Triethylborane (TEB)	Bartholomew	THB	55150	01-APR-89	30-SEP-93
63021404	Occupational Health Toxicology Guide	Hinga	THA	55711	01-APR-89	30-SEP-95
63021405	Refined Pregnancy Lactation Transfer Model	Fisher	TH	55740	01-APR-89	30-SEP-91
63021406	BIOLOGICAL MONITORING EXPOSURE INDICES	Channel	THA	52704	01-OCT-90	31-DEC-93
63021407	Retrospective Exposure Assessment Methods	Yu	THA	52704	01-APR-89	30-SEP-95

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
630214--	.00	----	SALARY COSTS	HSD/6106MD
63021402	200000.00	F33615-85-C-0532	Toxic Hazards Research	HSD/6302

NSI Technology Services Corporation

FY 90 TOTAL	200,000.00			
630214--	20908.92	-----	SALARY COSTS	HSI/6106MD
63021406	3415.50	-----	Supplies/Equipment-F2AMRL	HSD/6302
63021406	17305.00	-----	F2AMRL03020100/F33601-91-	HSD/6302
63021406	81406.00	-----	EQUIPMENT/F2AMRL003300200	HSD/6302
FY 91 TOTAL	123,035.42			
630214--	21536.19	-----	SALARY COSTS	HSC/6106MD
FY 92 TOTAL	21,536.19			
630214--	22182.28	-----	SALARY COSTS	HSD/6106MD
FY 93 TOTAL	22,182.28			
630214--	22847.74	-----	SALARY COSTS	HSD/6106MD
FY 94 TOTAL	22,847.74			

5 YEAR TOTAL 389,601.63

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

===== INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS =====

===== ADDITIONAL TASK INFORMATION =====

REQUIREMENTS SUPPORTED:

CUSTOMERS:

MAJOR EQUIPMENT:

FACILITIES:

Engineering Support Services for Project 6893

TASK MANAGER: Kenneth R Boff  
HEX - AV 785-7596

TASK NUMBER: 689300

OBJECTIVES:

This task provides general engineering support services to operate and maintain facilities and equipment and to assist in-house scientific researchers in the performance of tasks assigned to the Human Engineering Division. The only resources identified in the task summary sheets for this task are the resources used to manage the contracts assigned to this task or to provide general purpose support functions for Project 6893 that cannot be identified with any specific task. Products supported by the resources shown here will be listed in the summary sheets of the individual tasks with which those products are identified, even when substantial support for those products may have been provided by engineering support contracts assigned to this task.



TASK TITLE: Engineering Support Services for Project 6893

MIS CATEGORY: Core

MANAGER: Boff OFFICE: HEX PHONE: 57596 START: 01-OCT-81 STOP: 31-DEC-95 PRIMARY PROGRAM ELEMENT: 62202F

\*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED						5-YEAR TOTAL	
	FY 90	FY 91	FY 92	FY 93	FY 94		
Internal Funding							
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00	.00
Other Support Costs	53,534.14	79,989.38	92,298.56	85,496.12	89,720.16	401,038.36	
Internal Funding Subtotal	53,534.14	79,989.38	92,298.56	85,496.12	89,720.16	401,038.36	
External Funding							
Off-Site Contract Costs	1,933,065.00	.00	.00	.00	.00	1,933,065.00	
On-Site Contract Costs	100,000.00	.00	.00	.00	.00	150,000.00	
Civilian Salary Costs	.00	.00	.00	.00	.00	.00	.00
Other Support Costs	4,300.00	.00	.00	.00	.00	4,300.00	
External Funding Subtotal	2,037,365.00	50,000.00	.00	.00	.00	2,087,365.00	
Unfunded Requirements	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Total Annual Costs	\$ 2,090,899.14	\$ 129,989.38	\$ 92,298.56	\$ 85,496.12	\$ 89,720.16	\$ 2,488,403.36	
In-House Labor Hours							
Lambert (MILITARY)	192					192	
McFarren (MILITARY)	176					176	
Total Hours (Person-Years)	368 (.2)	(.0)	(.0)	(.0)	(.0)	368	

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
68930004	C3 Decision Making in Command Systems	Lambert	HED	58857	30-SEP-85	15-APR-91
6893000A	SDS PILOT COMMAND CENTER	Lambert	HED	58857	10-JUL-89	30-SEP-92
6893000B	TRAINING SYSTEM JOB AID INTERFACE	Lambert	HED	58857	02-AUG-89	30-SEP-91
6893000C	TRAINING DECISION INTERACT SIMULAT.	McFarren	HED	58822	02-AUG-89	30-SEP-91
6893000D	ASAT Mission Model Development	McFarren	HED	58822	14-AUG-89	30-SEP-91
6893000E	PCC HUMAN-IN-CONTROL	McFarren	HED	58822	31-DEC-89	31-DEC-91
6893000F	SUPPORT OF SDS PILOT CMD	McFarren	HED	58822	24-JAN-90	30-SEP-90
6893000H	SUPPORT OF SDS PILOT CMD	Lambert	HED	58857	23-JAN-90	30-SEP-91
6893000I	COGNITIVE MAPPING STUDY	Lambert	HED	58857	12-MAR-90	31-DEC-91
6893000J	JOINT STARS PROGRAM	Lambert	HED	58857	26-MAR-90	30-SEP-92
6893000K	DESIGN/IDEF MODELING	McFarren	HED	58822	16-MAY-90	31-DEC-92
6893000L	SUPPORT ASAT PROGRAM	Lambert	HED	58857	18-SEP-90	31-DEC-91
6893000M	CPN COMMAND AND CONMTROL	Lambert	HED	58857	01-OCT-81	31-DEC-95
6893000N	Project Fund Tracking	Redwine Smith	HEX	58853	01-OCT-86	31-DEC-94
6893000D	Project Travel Support	Redwine Smith	HEX	58853	01-OCT-86	31-DEC-94

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
689300--	28534.14	----	TRAVEL EXPENSES	HSD/6106MD
6893000C	58000.00	F33615-86-C-0545	Human Decision Making in Command Systems ALPHATECH, Inc.	AFHRL/AFHRL
6893000D	2000.00	----	JM4055 ARMY MIPR W31RPD-9	ARMY/ARMY
6893000E	16000.00	F33615-86-C-0545	Human Decision Making in Command Systems ALPHATECH, Inc.	ESD/ESD
6893000E	69000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	ESD/ESD
6893000E	990066.00	F33615-86-C-0545	Human Decision Making in Command Systems ALPHATECH, Inc.	ESD/ESD
6893000I	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	WRDC/WRDC
6893000J	9000.00	F33615-88-D-0536	System Engineering For Modeling/Simulation Research UNISYS Corporation	ESD/ESD
6893000J	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ESD/ESD
6893000J	172000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	ESD/ESD
6893000J	519000.00	F33615-88-D-0536	System Engineering For Modeling/Simulation Research UNISYS Corporation	ESD/ESD
6893000K	2300.00	----	TDY Reimbursement JM001	NAVY/NAVY
6893000M	99999.00	F33615-88-D-0536	System Engineering For Modeling/Simulation Research UNISYS Corporation	ARMY/ARMY
6893000D	25000.00	----	Mission travel	HSD/6893
FY 90 TOTAL	2,090,899.14	-----		
689300--	29989.38	----	TRAVEL EXPENSES	HSD/6106MD
6893000I	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	WL/WL
6893000D	50000.00	----	Mission travel	HSD/6893
FY 91 TOTAL	129,989.38	-----		

689300--	32298.56	-----	TRAVEL EXPENSES	HSD/6106MD
689300DD	10000.00	-----	(Marshak)	HSD/6893
689300ID	50000.00	-----	Travel Costs	HSD/6893
FY 92 TOTAL	92,298.56			

689300--	35496.12	-----	TRAVEL EXPENSES	HSD/6106MD
689300ID	50000.00	-----	Mission Travel	HSD/6893
FY 93 TOTAL	85,496.12			

689300--	39720.16	-----	TRAVEL EXPENSES	HSD/6106MD
689300ID	50000.00	-----	Mission Travel	HSD/6893
FY 94 TOTAL	89,720.16			

5 YEAR TOTAL 2,488,403.36

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED:

CUSTOMERS:

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MAJOR EQUIPMENT:  
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FACILITIES: Building 248, Building 33, Building 29, Building 196  
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NOTE: This task summary covers only administrative and support costs for an Operations and Maintenance contract that supports the entire project. Specific funding and products are listed under the individual workunits that supply funding to the contract.

Optical Countermeasures/Deception

TASK MANAGER: Michael G Dowler  
HEF - AV 785-3856

TASK NUMBER: 689301

OBJECTIVES:

1. Evaluate effectiveness of optical countermeasures (OCM) on visual and sensor performance.
2. Develop camouflage, concealment and deception (CCD) techniques and assess effectiveness.
3. Provide technical support to OCM and CCD user communities.

BACKGROUND:

This task supports the following requirements: ASD/AEG Memorandum of Agreement (MOA) for CCD, Integrating Charter for Air Force Air Base Operability for AD/YQ, F-16 Special Projects Office (SPO) HAVE WINE Memorandum of Understanding (MOU), Draft Tactical Air Forces Statement of Operational Need (SON) CCD, SAC SON for Wright Research and Development Center (WRDC) Avionics Laboratory's Coronet Prince and HAVE LAW programs, the Personnel Protection Programs of the Naval Air Development Center and the WRDC Materials Laboratory, the Advisory Group for Aerospace Research and Development (AGARD) Aerospace Medical Panel, the USAF Air Base Operability Research, Development and Acquisition Strategic Plan, the German Ministry of Defense and WRDC Avionics Laboratory's MOU for Infrared CCD, the Joint Logistics Commander's Panel on Battlefield Lasers, the Joint Test and Evaluation for Fixed Facility CCD Feasibility Study Charter, and the Development and Acquisition programs.

TASK TITLE: Optical Countermeasures/Deception

MIS CATEGORY: Thrust

MANAGER: Dowler OFFICE: HEF PHONE: 53856 START: 01-OCT-80 STOP: 30-SEP-96 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	318,000.00	259,000.00	258,000.00	216,000.00	201,000.00	1,252,000.00
On-Site Contract Costs	32,000.00	.00	.00	.00	.00	32,000.00
Civilian Salary Costs	8,556.80	4,706.82	4,848.02	4,993.46	2,742.26	25,847.36
Other Support Costs	231.09	242.88	261.58	287.47	321.68	1,344.70
Internal Funding Subtotal	358,787.89	263,949.70	263,109.60	221,280.93	204,063.94	1,311,192.06
External Funding						
Off-Site Contract Costs	79,472.00	102,000.00	.00	.00	.00	181,472.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	7,500.00	.00	.00	.00	7,500.00
External Funding Subtotal	79,472.00	109,500.00	.00	.00	.00	188,972.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 438,259.89	\$ 373,449.70	\$ 263,109.60	\$ 221,280.93	\$ 204,063.94	\$ 1,500,164.06
In-House Labor Hours						
Bridenbaugh	287	104	104	104	104	703
Dowler	1904	1904	1904	1904	1904	9520
Hartman	736					736
Marshak	134	104	104	104		446
Summers	64	64	64	64		256
Total Hours (Person-Years)	3125 (1.5)	2176 (1.0)	2176 (1.0)	2176 (1.0)	2008 (1.0)	11661

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
6893010A	68930130 Fund Tracking	Dowler	HEF	53856	10-APR-89	31-DEC-91
6893010E	Support of Camouflage, Concealment and Deception Program	Dowler	HEF	53856	30-JUN-87	30-SEP-91
6893010G	DIMENSIONAL DECOY KC-135	Dowler	HEF	53856	29-MAR-90	31-DEC-91
6893010H	FCS FIDELITY ANALYSIS	Dowler	HEF	53856	15-MAY-90	31-DEC-91
6893010I	JOINT CCD TEST AND EVALUATION	Dowler	HEF	53856	19-FEB-91	30-SEP-92
68930130	Optical Counter Measures Identification And Refinement	Dowler	HEF	53856	01-OCT-80	30-SEP-96
68930135	Optical Counter Measures Effectiveness Estimates	Dowler	HEF	53856	01-OCT-80	30-SEP-96
6893015D	RACS	Dowler	HEF	53856	15-AUG-88	31-DEC-89
6893015E	ADVANCED VISION CONCEPTS	Dowler	HEF	53856	23-APR-91	31-DEC-91
6893011D	SUPPORT OF CCD	Dowler	HEF	53856	01-MAR-88	30-SEP-91

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
689301--	231.09	-----	SUPPORT COSTS	HSD/6106MD
689301--	8556.80	-----	SALARY COSTS	HSD/6106MD
6893010E	25000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	ASD/ASD
6893010G	54472.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HQ SAC/SAC
68930130	32000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68930130	50000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/6893
68930130	70650.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/6893
68930130	127350.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/6893
68930135	70000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/6893
FY 90 TOTAL	438,259.89			

689301--	242.88	-----	SUPPORT COSTS	HSD/6106MD
689301--	4706.82	-----	SALARY COSTS	HSD/6106MD
6893010I	7500.00	-----	ARMY MIPR JMM037	ARMY/ARMY
6893010I	32000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	ARMY/ARMY
6893010I	70000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	WL/WL/PCMP
68930130	159000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/6893
68930135	100000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/6893
FY 91 TOTAL	373,449.70			

689301--	261.58	-----	SUPPORT COSTS	HSD/6106MD
689301--	4848.02	-----	SALARY COSTS	HSD/6106MD

68930130	170000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	HSD/6893
68930135	88000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	HSD/6893
FY 92 TOTAL	263,109.60			

689301--	287.47	----	SUPPORT COSTS	HSD/6106MD
689301--	4493.46	----	SALARY COSTS	HSD/6106MD
68930130	145000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	HSD/6893
68930135	71000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	HSD/6893
FY 93 TOTAL	221,280.93			

689301--	321.68	----	SUPPORT COSTS	HSD/6106MD
689301--	2742.26	----	SALARY COSTS	HSD/6106MD
68930130	145000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	HSD/6893
68930135	65006.00	F33615-87-C-0531	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	HSD/6893
FY 94 TOTAL	204,063.94			

5 YEAR TOTAL	1,930,164.06			
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\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

	COST	TITLE / PAYOFF / PARTIAL COSTS
FY 90	200000.00	TITLE: Imaging Systems Effectiveness PAYOFF: Integrated research to include human vision and other sensor systems in CCD and OCM will be enhanced. PARTIAL COSTS:

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*



\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

DESCRIPTION OF TECHNOLOGY TRANSITIONED

KC-135 Silhouette Decoy  
Hardened Aircraft Shelter Silhouette Decoys

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
Electro-Optical Products Division	Protection/Optical Sensors & Human Eyes/AgileLaser	Dowler

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

ACQUISITIONS SUPPORTED: IAF ROC 321-75, MOA HSD-AFEWC (HSD 38), IAC ROC 27-71, SAC ROC 4-76, IAC ROC 20-68, AFSC DG TW-6, AFWAL Investment Strategy, IAC 307-73, Defense Science Board Study, IAF 326-88, USAF 14-85 SON, IAF (USAF 014-85)-1-A SURD

CUSTOMERS: ASD/RW, WL/MLP, WL/AAW, ASD/AEG, ASD/YP, ASD/VF, Army/EW Lab, FID/SDEO, ASD/YQ, ARMY/WFS, Navy NADC, Navy NCCL, NPIC, AFSC

MAJOR EQUIPMENT: Scaled Airbase Terrain Boards, 3 Lasers, Zoom Cart and Lane, Scanning Array Camera, Real Target View Simulator, Computer Based Slave and Dynamic View Simulators

FACILITIES: Building 248 (Rooms 210D, 210C, 209), Building 33 (Room 120)

Manned Threat Quantification (MTQ)

TASK MANAGER: William P Marshak  
HED - AV 785-7555

TASK NUMBER: 689304

OBJECTIVES:

1. To establish methodologies for assessing the human element of threat air defenses.
2. To explore aircrew decision aiding concepts to enhance threat awareness, aircraft/aircrew survivability, and pilot tactical effectiveness.
3. To develop threat models for simulation and training that take into account the adaptive behavior of human operators.

BACKGROUND:

1. The Harry G. Armstrong Aerospace Medical Research Laboratory established the Manned Threat Quantification (MTQ) Program in 1974 to determine probability of hit (Ph) and manual (human operator) tracking characteristics of selected Soviet anti-aircraft artillery (AAA) systems. The focus was expanded in 1979-81 with the development of the Surface-to-Air Missile (SAM) and Man-Portable SAM (MPS) Simulators. The principal objective remained the quantification and modeling of human operator tracking performance. Current efforts focus on developing threat performance models which consider adaptive human behavior. Innovative methods including rule-based and neural net models are under development based on interactive manned simulations. The resulting threat models are more realistic than existing models. These models will be transitioned to training simulators and electronics warfare flight ranges.
2. This program supports AFSC PMD 63244-84-36, Aircraft Non-Nuclear Survivability.

TASK Title: Manned Threat Quantification (MIQ)

MIS CATEGORY: Core

MANAGER: Marshak

OFFICE: HED

PHONE: 57555

START: 01-OCT-80

STOP: 30-SEP-93

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	137,212.00	103,000.00	222,000.00	.00	190,000.00	652,212.00
On-Site Contract Costs	93,438.00	75,000.00	.00	196,000.00	.00	364,438.00
Civilian Salary Costs	1,853.00	.00	.00	.00	.00	1,853.00
Other Support Costs	23,425.68	.00	.00	.00	.00	23,425.68
Internal Funding Subtotal	255,928.68	178,000.00	222,000.00	196,000.00	190,000.00	1,041,928.68
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 255,928.68	\$ 178,000.00	\$ 222,000.00	\$ 196,000.00	\$ 190,000.00	\$ 1,041,928.68

In-House Labor Hours

Fix	1273					1273
Summers	62					62

Total Hours (Person-Years)	1335 (.6)	(.0)	(.0)	(.0)	(.0)	1335
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## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
68930467	Knowledge-Based Concepts for Survivability Control	Fix	HED	57590	01-OCT-85	30-SEP-90
68930469	AIR DEF INTERACTIVE SIM	Marshak	HED	57555	01-SEP-88	30-SEP-93
6893047A	68930467 Fund Tracking (Survivability Control)	Fix	HED	57590	30-SEP-85	30-SEP-92
6893049A	SUPPORT FOR 68930469	Marshak	HED	57555	01-OCT-89	30-SEP-92

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
689304--	1853.00	----	SALARY COSTS	HSD/6106MD
68930469	15638.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/6893
68930469	23862.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF	HSD/6893

68930469	69500.00	F33615-87-C-0531	Science Applications International Corp	
6893047A	23425.68	----	System Engineering Design and Technical Analysis For SACDEF	HSD/6893
6893049A	76.00	F33615-89-C-0532	Science Applications International Corp	
6893049A	28212.00	F33615-87-C-0531	ADPE MAINTENANCE -AAMRLC-	HSD/6893
6893049A	93362.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
FY 90 TOTAL	255,928.68		System Engineering Design and Technical Analysis For SACDEF	HSD/6893
68930469	30000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68930469	45000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
6893049A	6000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF	HSD/6893
6893049A	20000.00	F33615-87-C-0531	Science Applications International Corp	
6893049A	77000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF	HSD/6893
FY 91 TOTAL	178,000.00		Science Applications International Corp	HSD/6893
6893049A	222000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF	HSD/6893
FY 92 TOTAL	222,000.00		Science Applications International Corp	
6893049A	196000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
FY 93 TOTAL	196,000.00			
6893049A	190000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF	HSD/6893
FY 94 TOTAL	190,000.00		Science Applications International Corp	

5 YEAR TOTAL 1,041,928.68

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90128		PROCEEDINGS	Fix, E	Modeling Human Performance with Neural Networks
90129		ORAL PRESENTATION	Fix, E	Modeling Human Performance with Neural Networks
90055		ABSTRACT	Fix, E	Neural Network Based Human Performance Modeling
90110		PROCEEDINGS	Fix, E	Neural Network Based Human Performance Modeling
90111		ORAL PRESENTATION	Fix, E	Neural Network Based Human Performance Modeling
90184		OTHER - WHITE PAPER	Fix, E	The Operator is the Key

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
Rockwell International Corp/Avionics Advanced Tech	Artificial Intelligence Applications	Fix
McDonnell Douglas Missile Systems Company	Artificial Intelligence	Fix
Ford Aerospace Space Missions Group	Intelligent Command and Control Systems	Fix
Lockheed Missiles & Space Co., Inc. - R&D Division	Learning Systems	Fix
IBM Systems Integration Division	Neural Network Technology	Fix

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: Non-Nuclear Survivability PMD for A/C

CUSTOMERS: JTCG/AS, AFWAL/AA, AFWAL/FI, USAFCSA, ASD/EN, ASD/XR, ASD/RW, FTD, NWC, NSWC

MAJOR EQUIPMENT: SEL 32/55 Computer (2), MPSS Simulator, Threat C3 Simulator, SAM Simulator, AAA Simulator, LMI Lambda 2x2/Plus, MANTA Simulator, Silicon Graphics IRIS 2400T, SG IRIS 3130, Video Generation Equipment

FACILITIES: Building 248, Building 33

Human Information Processing and System Control

TASK MANAGER: Grant R McMillan  
HEF - AV 785-8746

TASK NUMBER: 689306

OBJECTIVES:

1. Identify information (cues) for flight control.
2. Describe and model perception - performance processes involved.
3. Identify effective techniques for providing required cues.
4. Transition data, models and improved hardware to users.

BACKGROUND:

1. Because these objectives are being addressed as critical issues for flight simulation, this task is responsive to PMD 6077(17)/64227F (Feb 90).
2. This task received significant funding from the ASD Training Systems SPO (ASD/YW) under OA's 61690HY101, and 61690HY193.

TASK TITLE: Human Information Processing and System Control

MIS CATEGORY: Core

MANAGER: McMillan OFFICE: HEF PHONE: 58746 START: 27-JAN-77 STOP: 30-SEP-96 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	57,836.00	.00	.00	.00	57,836.00
On-Site Contract Costs	241,000.32	263,000.00	292,000.00	258,000.00	214,000.00	1,268,000.32
Civilian Salary Costs	85,341.00	93,997.78	90,898.66	93,625.62	122,024.49	485,887.55
Other Support Costs	318.75	335.01	360.80	396.52	443.71	1,854.79
Internal Funding Subtotal	326,660.07	415,168.79	583,259.46	352,022.14	336,468.20	1,813,578.66
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	650,000.00	.00	.00	.00	.00	650,000.00
Civilian Salary Costs	.00	1,848.00	.00	.00	.00	1,848.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	650,000.00	1,848.00	.00	.00	.00	651,848.00
Unfunded Requirements	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Total Annual Costs	\$ 976,660.07	\$ 417,016.79	\$ 383,259.46	\$ 352,022.14	\$ 336,468.20	\$ 2,465,426.66
In-House Labor Hours						
Billman	(MILITARY) 190	1791	1791	1791	1791	190
Curry	(MILITARY) 480	208	1856	1856	1856	7644
McKechnie	275	1856	66	66	1860	483
McMillan	1856	66	930	930	104	9280
Schueren	146	104	104	104	104	146
Summers	66	930	104	104	104	264
Warren	894	104	104	104	104	5544
Whiteley	772	4955 (2.2)	4747 (2.3)	4747 (2.3)	5611 (2.7)	1188
Total Hours (Person-Years)	4679 (2.2)	4955 (2.4)	4747 (2.3)	4747 (2.3)	5611 (2.7)	24739

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

## WORKUNIT WORKUNIT TITLE

WORKUNIT	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
3005H108	McMillan	HEF	58746	29-MAR-91	30-JUN-92
68930601	McMillan	HEF	58746	27-JAN-77	30-SEP-96
68930609	McKechnie	HEF	58746	01-APR-81	30-SEP-91
68930610	McMillan	HEF	58746	24-JUL-85	31-DEC-89
68930612	McMillan	HEF	58746	01-OCT-90	30-SEP-93
68930613	Warren	HEF	58746	08-JAN-87	30-SEP-96
6893061A	McMillan	HEF	58746	24-FEB-86	30-SEP-92
6893061B	McMillan	HEF	58746	18-AUG-87	30-SEP-91
6893061C	Billman	HEF	58806	25-APR-88	31-DEC-92
6893061D	Fracker	HEG	58737	15-FEB-89	31-DEC-92
6893061E	Billman	HEF	58806	27-JUN-89	30-SEP-90
689306D1	Billman	HEF	58806	09-NOV-88	30-SEP-92



\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005H1--	318.75	-----	SUPPORT COSTS	HSD/6106MD
689306--	85341.00	-----	SALARY COSTS	HSD/6106MD
68930601	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68930609	.32	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68930613	350.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68930613	140650.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
6893061A	200000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ASD/ASD
6893061A	450000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ASD/ASD
FY 90 TOTAL	976,660.07			

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005H1--	335.01	-----	SUPPORT COSTS	HSD/6106MD
3005H108	7836.00	F41624-91-P-0012	Passive Sensor Altitude and Terrain Awareness System Charles River Analytics, Inc	HSD/3005
3005H108	50000.00	F41624-91-P-0012	Passive Sensor Altitude and Terrain Awareness System Charles River Analytics, Inc	HSD/3005
689306--	93997.78	-----	SALARY COSTS	HSD/6106MD
68930601	163000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68930613	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
6893061B	1848.00	-----	JM6301 NASA MIPR A56301C	NASA/NASA
FY 91 TOTAL	417,016.79			

3005H1--	360.80	-----	SUPPORT COSTS	HSD/6106MD
689306--	90898.66	-----	SALARY COSTS	HSD/6106MD

68930601	167000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68930613	125000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
FY 92 TOTAL	383,259.46			
3005H1--	396.52	-----	SUPPORT COSTS	HSD/6106MD
689306--	93625.62	-----	SALARY COSTS	HSD/6106MD
68930601	148000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68930613	110000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/6893
FY 93 TOTAL	352,022.14			
3005H1--	443.71	-----	SUPPORT COSTS	HSD/6106MD
689306--	122024.49	-----	SALARY COSTS	HSD/6106MD
68930601	114000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68930613	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
FY 94 TOTAL	336,468.20			

5 YEAR TOTAL 2,465,426.66

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90342		PROCEEDINGS	McMillan, G R Brown, Y J Cardullo, F M	Advanced Techniques for Cuing the Force and Motion Environment in the Simulator of the Future
90343		ORAL PRESENTATION	McMillan, G R Brown, Y J Cardullo, F M	Advanced Techniques for Cuing the Force and Motion Environment in the Simulator of the Future

PROCEEDINGS	McMillan, G R Cress, J D Middendorf, M S	Dynamic Seat Cuing with Wide Versus Narrow Field-of-View Visual Displays
90308		
90309	McMillan, G R Cress, J D Middendorf, M S	Dynamic Seat Cuing with Wide Versus Narrow Field-of-View Visual Displays
90234	Warren, R	Methodological Problems in Applied Cognition and Perceptual Research: Theoretical Implications
90017	Warren, R	Preliminary Questions to the Study of Egomotion
90288	Whiteley, J D Lusk, S L Middendorf, M S	The Effects of Simulator Time Delays on a Sidestep Landing Maneuver: A Preliminary Investigation
90289	Whiteley, J D Lusk, S L Middendorf, M S	The Effects of Simulator Time Delays on a Sidestep Landing Maneuver: A Preliminary Investigation
90334	Lusk, S L Martin, C D Whiteley, J D Johnson, W V	Time Delay Compensation Using Peripheral Visual Cues in an Aircraft Simulator

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

#### CUSTOMERS

ASD/YW, ASD/EN, AFHRL/OI

Government

#### DESCRIPTION OF TECHNOLOGY TRANSITIONED

Chairman/member of Simulator Fidelity and Visual Training Effectiveness Working  
Groups

Lecture on Simulator Cue Integration and Synchronization at SUNY/AIAA Simulation  
Short Course

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

#### CUSTOMERS

University, Industry

#### DESCRIPTION OF TECHNOLOGY TRANSFERED

Lecture on Simulator Cue Integration and Synchronization at SUNY/AIAA Simulation  
Short Course

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

#### COMPANY

IRAD TOPIC

EVALUATOR

CAE-Link Corp, Link Flight Simulation Div	Motion Platform Safety Factor Improvement	McMillan
General Electric, Simulation & Control Sys.Dept.	Advanced CIG Systems	McMillan
General Electric, Simulation & Control Sys.Dept.	Advanced Algorithms and Architectures	McMillan

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: PMD 6077(16) 64227F (8 Mar 89)

CUSTOMERS: ASD/YW, ASD/EN, AFHRL/OT

MAJOR EQUIPMENT: Roll-Axis Tracking Sim, Adv Low-Cost G-Cuing Sys, Visual Flt Research Sim, Time Delay Research Bay, EAI:2000, 580(1), IRIS 2400 Graphics Systems(4), VAX 11/750, PDP 11/60(2), PDP 11/34, Microvax(3)

FACILITIES: Building 33, Room 339 - Flight Simulation Laboratory, Room 23 - Motion Base Simulation Facility

Experimental Man in Space (EXMIS)

TASK MANAGER: James D Whiteley  
HEF - AV 785-8763

TASK NUMBER: 689311

OBJECTIVES:

1. To examine human dexterity and control capabilities and assist in design of aids to accomplish militarily relevant tasks in the space environment.
2. To assess the effects of microgravity on the psychophysiological status that may affect performance and workload capabilities in space.
3. To quantify human visual capabilities and correlate visual performance with task performance on earth and in space.
4. To determine the design configuration and applicability of a ground based simulator for training and performance evaluation with telescopic visual search tasks.
5. To develop airborne and space telescope system design characteristics and evaluate human performance capabilities to perform militarily related visual search, target acquisition, and data extraction tasks using a direct view optical system.

BACKGROUND:

Space missions place intrinsically rigorous demands on humans, involving not only the normal stresses of flight, sustained operations, high workload, and physical discomfort, but also the unusual additional stresses and work complications due to microgravity. To establish a military presence in space, it is necessary to understand how microgravity affects human performance. Our efforts include assessment of visual performance, psychophysiological status, and dexterity for the design of EVA gloves and hand control systems to aid performance. Military man-in-space operations will be substantially involved with the capabilities of the human visual system in combination with optical aids. Our research and development approach is to develop direct view observation systems and evaluate human capabilities in a stepwise manner from simulator, then airborne studies, to space-flight. Equipment development will progress from relatively simple to increasingly complex optical systems in order to fully investigate magnification, field-of-view, and performance trade-offs. Human visual performance will be monitored during these missions to determine any variability in task performance due to visual changes. Task efforts are basically divided into two areas: 1. Military Performance in Microgravity, and 2. Visual Search, Target Acquisition, and Recording (VSTAR).

AAMR TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91  
TASK TITLE: Experimental Man in Space (EXMIS)

TASK NUMBER: 689311  
MIS CATEGORY: Thrust

MANAGER: Whiteley OFFICE: HEF PHONE: 38763 START: 25-APR-83 STOP: 30-SEP-96 PRIMARY PROGRAM ELEMENT: 62202F

\*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	73,076.00	50,000.00	50,000.00	20,000.00	20,000.00	213,076.00
On-Site Contract Costs	650,000.00	520,000.00	342,000.00	360,000.00	305,000.00	2,177,000.00
Civilian Salary Costs	40,335.60	45,932.48	25,998.53	25,576.35	23,933.90	161,776.86
Other Support Costs	16,508.47	729.89	786.09	863.91	966.72	19,855.08
Internal Funding Subtotal	779,920.07	616,662.37	418,784.62	406,440.26	349,900.62	2,571,707.94
External Funding						
Off-Site Contract Costs	.00	65,000.00	.00	.00	.00	65,000.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	65,000.00	.00	.00	.00	65,000.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 779,920.07	\$ 681,662.37	\$ 418,784.62	\$ 406,440.26	\$ 349,900.62	\$ 2,636,707.94
In-House Labor Hours						
Block (MILITARY)	602	1284	1284	1284	1284	5738
Bridenbaugh	286	104	104	104	104	702
Curry (MILITARY)		209	209	209	209	836
Donohue-Perry		340	340	340	340	1360
LaPuma (MILITARY)	1724	287				2011
Merkel	1078	1078				2156
O Neal (MILITARY)	934	934	934	934	934	4670
Pinkus	36	36	562	562	562	1758
Task	64	64	64	64		256
Whiteley (MILITARY)	836	1504	1604	1504	1504	6952
Yates	398	398	50			846
Total Hours (Person-Years)	5958 (2.9)	6238 (3.0)	5151 (2.5)	5001 (2.4)	4937 (2.4)	27285

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
68931102	Visual Perf Capability	Task	HEF	58739	01-OCT-84	30-SEP-96
68931103	Space Systems Human Engineering Design Methodology	Yates	HEF	57587	01-MAR-85	30-SEP-92
68931106	FORM/FUNCTION IN MAN CONT	Robinette	HEF	58810	01-APR-87	30-SEP-91
6893111A	SPACEBORNE DVOS	Task	HEF	58739	17-MAY-91	30-SEP-92
6893112A	Support Spaceborne DVOS	Task	HEF	58739	09-SEP-87	31-DEC-92
6893112C	Research Image Generation System	Task	HEF	58739	01-OCT-87	31-DEC-92
6893112D	Evaluation of Night Vision Goggles	Pinkus	HEF	58767	01-OCT-87	30-SEP-92
6893112F	Space Shuttle Telescope	Task	HEF	58739	01-OCT-87	31-DEC-92
6893112F	Spadvos/Terra Scout	Task	HEF	58739	16-MAY-88	31-DEC-92

893112G B-52 SIMULATOR PROJECT  
 893112H NVG HUD  
 893113A Motion Analysis Theory  
 893113B Data Base Support

Craig  
 Task  
 Robinette  
 Robinette

HEF  
 HEF  
 HEG  
 HEG

57592  
 58739  
 58810  
 58810

31-DEC-92  
 30-SEP-92  
 30-SEP-91  
 30-SEP-91

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

W R K U N I T	C O S T	C O N T R A C T N U M B E R	C O N T R A C T T I T L E A N D N A M E O F C O N T R A C T O R ( I F K N O W N )	F U N D S O U R C E
689311--	694.47	----	SUPPORT COSTS	HSD/6106MD
689311--	40335.60	----	SALARY COSTS	HSD/6106MD
68931102	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68931102	104350.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68931102	105650.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68931103	35000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
6893112A	15000.00	----	AF Form 616 90-30	HSD/6893
6893112A	18976.00	F33615-86-D-0540	Engineering Support for Rapid Prototyping, Test, and Evaluation University of Dayton Research Institute	HSD/6893
6893112A	305000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
6893113A	814.00	----	AAMRLB900C08C/F33600-90-F	HSD/6893
6893113A	54100.00	F33615-85-C-0531	Analysis of Human Size, Form, Function for Improving Air Systems Anthropology Research Project, Inc.	HSD/6893
FY 90 TOTAL	779,920.07			
689311--	729.89	----	SUPPORT COSTS	HSD/6106MD
689311--	45932.48	----	SALARY COSTS	HSD/6106MD
68931102	304000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68931103	16000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68931103	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893

6893111A	10000.00	-----	SALARY REIMBURSEMENT/JP91	HSD/HSD
6893112A	150000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/HSD
6893112F	65000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	ARMY/ARMY
6893113A	50000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/6893
FY 91 TOTAL	691,662.37			
689311--	786.09	-----	SUPPORT COSTS	HSD/6106MD
689311--	34121.70	-----	SALARY COSTS	HSD/6106MD
68931102	300000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68931103	42000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
6893113A	50000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/6893
FY 92 TOTAL	426,907.79			
689311--	863.91	-----	SUPPORT COSTS	HSD/6106MD
689311--	25576.35	-----	SALARY COSTS	HSD/6106MD
68931102	280000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68931103	80000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
6893113A	20000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/6893
FY 93 TOTAL	406,440.26			
689311--	966.72	-----	SUPPORT COSTS	HSD/6106MD
689311--	23933.90	-----	SALARY COSTS	HSD/6106MD
68931102	225000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/6893
68931103	80000.00	F33615-89-C-0532	Engineering Support	HSD/6893



LOGICON, Inc

HSD/6893

Human Morphometrics, Motion, and Performance  
Anthropology Research Project, Inc.

F33615-89-C-0572

20000.00

6893113A

349,900.60

FY 94 TOTAL

5 YEAR TOTAL 2,654,831.11

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

INVENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90275	B144118	TECHNICAL REPORT	Merkel, H S Task, H L Whiteley, J D LaPuma, P T	The Development of the Spaceborne Direct-View Optical System (SpaDVOS)

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
McDonnell Douglas Space Systems Company	Crew/Machine Interface	Vikmanis

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: SAC/SPACECMD SON for Trans-Atmospheric Vehicle/Military Aerospace Vehicle, AAMRL/Space Division MOA for Series of Visual Performance Assessments, Space Command Military Man-in-Space Program

CUSTOMERS: AFSC/XR, ASD/XR, SD/YM, SPACECMD/XP

MAJOR EQUIPMENT: Visual Function Testers, Behavioral Test Battery, Applied Visual Performance Lab, Electrophysiology Lab, Vision Baseline Test Facility

FACILITIES: Building 248 (rooms 209,210), Building 33 (Rooms 227,229)

Engineering Support Services for Project 7184

TASK MANAGER: Kenneth R Boff  
HEX - AV 785-7596

TASK NUMBER: 718400

OBJECTIVES:

This task provides general engineering support services to operate and maintain facilities and equipment and to assist in-house scientific researchers in the performance of tasks assigned to the Human Engineering Division. The only resources identified in the task summary sheets for this task are the resources used to manage the contracts assigned to this task or to provide general purpose support functions for Project 7184 that cannot be identified with any specific task. Products supported by the resources shown here will be listed in the summary sheets of the individual tasks with which those products are identified, even when substantial support for those products may have been provided by engineering support contracts assigned to this task.

TASK TITLE: Engineering Support Services for Project 7184

MIS CATEGORY: Mixed

MANAGER: Boff

OFFICE: HEX

PHONE: 57596

START: 02-MAR-81

STOP: 30-SEP-97

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	217,784.00	42,716.00	.00	.00	.00	260,500.00
On-Site Contract Costs	114,000.00	100,000.00	.00	.00	.00	214,000.00
Civilian Salary Costs	284,244.50	286,105.91	285,950.95	281,114.58	105,983.87	1,243,399.81
Other Support Costs	641,160.75	774,582.45	711,453.91	725,952.85	745,106.24	3,598,256.20
Internal Funding Subtotal	1,257,189.25	1,203,404.36	997,404.86	1,007,067.43	851,090.11	5,316,156.01
External Funding						
Off-Site Contract Costs	50,000.00	.00	.00	.00	.00	50,000.00
On-Site Contract Costs	60,025.00	950,919.00	.00	.00	.00	1,010,944.00
Civilian Salary Costs	24,000.00	24,000.00	.00	.00	.00	48,000.00
Other Support Costs	38,654.84	.00	.00	.00	.00	38,654.84
External Funding Subtotal	172,679.84	974,919.00	.00	.00	.00	1,147,598.84
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 1,429,869.09	\$ 2,178,323.36	\$ 997,404.86	\$ 1,007,067.43	\$ 851,090.11	\$ 6,463,754.85
In-House Labor Hours						
Arndt	629	918	918	918		629
Aume	918	698	698	698	349	3672
Bates	698					3141
Billman	172					172
Cato	1504	1504	632	632		3008
Centers	605	632	1084	541		2501
Craig	542	542	63	63	541	3250
Kocian	63	63	1769	1769	1769	252
Kulwicki	1769	1769	1262	1262		8845
Linhart	1490	1490	1130	1130		5504
McDaniel	1130	1130	720	720		4520
Mills	668	720	930	930		2828
Warren	930	434	434	436	436	3720
Yates	434					2174
Total Hours (Person-Years)	11552 (5.6)	10830 (5.2)	9640 (4.6)	9099 (4.4)	3095 (1.5)	44216

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

## WORKUNIT WORKUNIT TITLE

WORKUNIT	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
71840008 Equipment Rental/Maintenance	Summers	HEX	57577	02-MAR-81	30-SEP-92
7184000C HE Support for CAT	Bates	HE	57580	01-APR-88	30-SEP-94
71840013 Breadboarding I&T	Yates	HEG	57587	15-NOV-84	12-JUN-91
71840014 Engineering Support	Linhart	HEX	57573	15-MAR-85	05-MAR-91
71840015 H1 Level Academic Support	Craig	HEF	57592	03-FEB-86	30-SEP-92
71840017 Rapid Prototyping I&E	Yates	HEG	57587	01-MAY-87	14-MAY-91

71840018	System Engineering Simulation Research	Mills	57588	J1-DEC-87	31-DEC-92
71840019	Technical Support for Human Engineering Laboratories	Linhart	57573	13-SEP-89	13-SEP-93
7184001A	LANTIRN SOFTWARE ENGINEERING	Linhart	57573	19-JUL-90	31-DEC-93
71840020	PROTO OF HUMAN ENGINEERING TECHNOLOGIES	Yates	57587	01-SEP-90	30-SEP-95
71840021	ACADEMIC SUPPORT FOR HUMAN ENGINEERING	Craig	57592	01-DEC-91	30-SEP-97
7184002D	PROTO OF HUMAN ENGINEERING TECHNOLOGIES	Yates	57587	01-SEP-90	30-SEP-95
71840089	PERFORMANCE ENHANCEMENT	Bates	57580	01-DEC-88	31-DEC-92
718400A1	STRATEGIC MSN ANALYSIS	Collins	57600	17-OCT-88	30-SEP-90
718400C3	FY-91 CAT ADMINISTRATIVE SUPPORT	Maine	52523	01-OCT-86	30-SEP-91
718400C4	Support for VIC Program	Boff	57596	01-MAR-87	30-SEP-93
718400C5	SUPPORT FOR VIC PROGRAMS	Bates	57580	22-MAR-90	30-SEP-91
718400DD	Project Fund Tracking	Redwine Smith	58853	01-OCT-81	31-DEC-94
718400DG	Pre-ADSACS and VCS Workload	Kuperman	53727	09-APR-86	30-SEP-91
718400FT	ADVOS	Merkel	58763	08-JAN-87	30-SEP-90
718400PA	DARPA-NONLINEAR MATERIALS	Linhart	57573	07-JUN-90	30-SEP-91
718400PC	ADPE Expenditures	Summers	57577	01-OCT-87	30-SEP-91
718400PK	Cockpit Automation Technology Test Support	Kulwicki	57600	19-DEC-86	30-SEP-91
718400SA	SUPPORT FOR STRC/RIIS	Redwine Smith	58853	01-OCT-86	31-DEC-92
718400SC	Support To HEX - CAT	Redwine Smith	58853	01-OCT-86	30-SEP-91
718400SR	Support Strc/RIIS Systems	Purvis	57560	01-OCT-87	31-DEC-92
718400ST	STRENGTH APTITUDE TEST	McDaniel	52558	01-MAR-89	31-DEC-92
718400TD	Project Travel Support	Redwine Smith	58853	01-OCT-86	31-DEC-95

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
718400--	97.80	----	SUPPORT COSTS	HSD/6106MD
718400--	129286.79	----	TRAVEL EXPENSES	HSD/6106MD
718400--	284244.50	----	SALARY COSTS	HSD/6106MD
71840008	674.40	----	Lease/Rental of Hardware/	HSD/7184
71840008	912.00	----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	1020.00	----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	1056.00	----	ADPE Maintenance/re/AAMRL	HSD/7184
71840008	1070.04	----	Lease/Rental of Hardware/	HSD/7184
71840008	1070.04	----	Lease/Rental of Hardware/	HSD/7184
71840008	1597.00	----	Lease/Rental of Hardware/	HSD/7184
71840008	1907.40	----	Lease/Rental of Hardware/	HSD/7184
71840008	1966.72	----	Lease/Rental of Hardware/	HSD/7184
71840008	2450.00	----	Lease/Rental of Hardware/	HSD/7184
71840008	2500.00	----	Lease/Rental of Hardware/	HSD/7184

71840008	3171.84	-----	Lease/Rental of Hardware/	HSD/7184
71840008	3807.80	-----	Lease/Rental of Hardware/	HSD/7184
71840008	4000.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	4365.36	-----	Lease/Rental of Hardware/	HSD/7184
71840008	4920.00	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	5000.00	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	5200.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	5225.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	5280.00	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	5750.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	5240.00	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	6338.76	-----	Lease/Rental of Hardware/	HSD/7184
71840008	7044.00	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	7656.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	8736.00	-----	ADPE MAINTENANCE -AAMRLC-	HSD/7184
71840008	10050.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	10224.00	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	11760.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	17555.76	-----	Lease/Rental of Hardware/	HSD/7184
71840008	20140.80	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	22211.34	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	25800.00	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	29684.28	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	30672.00	-----	ADPE MAINTENANCE - AAMRLC	HSD/7184
71840008	36682.62	-----	Lease/Rental of Hardware/	HSD/7184
71840018	25000.00	F33615-88-D-0536	System Engineering For Modeling/Simulation Research UNISYS Corporation	HSD/7184
71840018	50000.00	F33615-88-D-0536	System Engineering For Modeling/Simulation Research UNISYS Corporation	ESD/ESD
71840018	74162.00	F33615-88-D-0536	System Engineering For Modeling/Simulation Research	HSD/7184

71840018	79122.00	F33615-88-D-0536	UNISYS Corporation System Engineering for Modeling/Simulation Research UNISYS Corporation	HSD/7184
71840019	60025.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	DARPA/DARPA
718400C3	10000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/VIC
718400C3	24000.00	-----	JP1268 ASD-0-1268 SALARY	ASD/CAT
718400C4	36000.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	HSD/CAT
718400C4	64000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/CAT
718400C4	105000.00	-----	MIPR FQ7624-90-00060/DL49	HSD/CAT
718400C5	16073.88	-----	IDY Reimbursement	HSD/YAH/VIC
718400DD	2691.00	-----	AAMRLB-90-00124/F01620-90	HSD/7184
718400DD	3500.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	HSD/7184
718400DD	6386.00	-----	AF FORM 616 HY-90-27 / F3	HSD/7184
718400DD	7960.00	-----	Supplies/Equipment/AAMRLB	HSD/7184
718400PK	40000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/CAT
718400SA	22580.96	-----	JP0122 TDY Reimbursement	EGLIN/EGLIN
718400ID	76000.00	-----	Mission travel	HSD/7184
FY 90 TOTAL	1,429,869.09			
718400--	102.79	-----	SUPPORT COSTS	HSD/6106MD
718400--	135880.42	-----	TRAVEL EXPENSES	HSD/6106MD
718400--	284515.78	-----	SALARY COSTS	HSD/6106MD
71840008	60.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	99.80	-----	AAMRLC-90-C/508/F33600-91	HSD/7184
71840008	133.00	-----	SUPPLY/AAMRLB9100009/F016	HSD/7184
71840008	346.00	-----	Lease/Rental of Hardware/	HSD/7184

71840008	442.00	-----	SUPPLY/AAMRLB910008/F016	HSD/7184
71840008	480.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	496.20	-----	ADPE MAINTENANCE/AAMRLC90	HSD/7184
71840008	550.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	660.00	-----	ADPE MAINTENANCE /AAMRLC-	HSD/7184
71840008	674.25	-----	Lease/Rental of Hardware/	HSD/7184
71840008	850.00	-----	Software Maintenance/AAMR	HSD/7184
71840008	900.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	923.52	-----	Software Maintenance/AAMR	HSD/7184
71840008	1020.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	1020.81	-----	Lease/Rental of Hardware/	HSD/7184
71840008	1044.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	1216.56	-----	Software Maintenance/AAMR	HSD/7184
71840008	1597.50	-----	Lease/Rental of Hardware/	HSD/7184
71840008	1624.00	-----	Lease/Rental of Software/	HSD/7184
71840008	1710.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	2214.60	-----	Software Maintenance/AAMR	HSD/7184
71840008	2340.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	2500.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	2754.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	2940.00	-----	Software Maintenance/AAMR	HSD/7184
71840008	3083.64	-----	Software Maintenance/AAMR	HSD/7184
71840008	3750.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	4020.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	4250.00	-----	Software Maintenance/AAMR	HSD/7184
71840008	4251.56	-----	Software Maintenance/AAMR	HSD/7184
71840008	4788.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	5400.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	5525.00	-----	Software Maintenance/AAMR	HSD/7184

71840008	5988.00	-----	Software Maintenance/AAMR	HSD/7184
71840008	6276.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	6900.00	-----	Software Maintenance/AAMR	HSD/7184
71840008	6908.40	-----	Lease/Rental of Hardware/	HSD/7184
71840008	6954.42	-----	Lease/Rental of Hardware/	HSD/7184
71840008	7656.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	8940.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	9996.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	10020.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	10650.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	11808.00	-----	Lease/Rental of Hardware/	HSD/7184
71840008	16764.00	-----	Software Maintenance/AAMR	HSD/7184
71840008	18256.46	-----	Software Maintenance/AAMR	HSD/7184
71840008	24285.88	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	25296.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840008	28710.48	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840003	35940.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7184
71840003	37300.68	-----	Software Maintenance/AAMR	HSD/7184
71840018	42716.00	F33615-88-D-0536	System Engineering For Modeling/Simulation Research UNISYS Corporation	HSD/7184
71840019	890919.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ASD/ASD
718400C3	24000.00	-----	JP1117 ASD-1-1117	ASD/CAT
718400C4	60000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	ASD/ASD
718400C4	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/CAT
718400DD	95.71	-----	AF 616 HY-91-26/F0260491M	HSD/7184
718400DD	993.00	-----	ADPE MAINTENANCE/AAMRLB91	HSD/7184
718400DD	1000.00	-----	P.O. TO MED CEN/SCM (P.O.	HSD/7184
718400D	1161.78	-----	AF 616 HY-91-26/F0260491M	HSD/7184



71840000	2482.70	-----	Software/AAMRI B9100098	HSD/7184
71840000	4243.00	-----	Equip/AAMRI B9100037/10162	HSD/7184
71840000	8043.00	-----	Equip/AAMRI B9100037/10162	HSD/7184
71840000	10000.00	-----	AF 616 HY 91-22 TO AFOSP/	HSD/7184
71840000	10919.00	-----	Equip/AAMRI B9100092/10162	HSD/7184
71840000	12000.00	-----	MIPR to Army Research Ins	HSD/7184
71840000	18743.01	-----	AF 616 HY 91-26 TO LUKI A	HSD/7184
71840000	21000.00	-----	MIPR to DFSC-PCS	HSD/7184
71840000	45000.00	-----	AF FORM 185 for 4550th IW	HSD/7184
71840000	50913.78	-----	Equipment Rental/Maintena	HSD/7184
71840000	109000.00	-----	Mission travel	HSD/7184
FY 92 TOTAL		2,176,733.23		
-----				
718400--	110.70	-----	SUPPORT COSTS	HSD/6106MD
718400--	146343.21	-----	TRAVEL EXPENSES	HSD/6106MD
718400--	284313.12	-----	SALARY COSTS	HSD/6106MD
71340008	465000.00	-----	Maintenance Contracts	HSD/7184
71840000	100000.00	-----	Travel Costs	HSD/7184
FY 92 TOTAL		995,767.03		
-----				
718400--	121.66	-----	SUPPORT COSTS	HSD/6106MD
718400--	160831.19	-----	TRAVEL EXPENSES	HSD/6106MD
718400--	281114.58	-----	SALARY COSTS	HSD/6106MD
71840008	465000.00	-----	Maintenance Contracts	HSD/7184
71840000	100000.00	-----	Mission Travel	HSD/7184
FY 93 TOTAL		1,007,067.43		
-----				
718400--	136.14	-----	SUPPORT COSTS	HSD/6106MD
718400--	105983.87	-----	SALARY COSTS	HSD/6106MD

718400--	179970.10	-----	TRAVEL EXPENSES	HSD/6106MD
7 840008	465000.00	-----	Maintenance Contracts	HSD/7184
718400JD	100000.00	-----	Mission Travel	HSD/7184

FY 94 TOTAL 851,090.11

5 YEAR TOTAL 6,460,526.89

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
94329		PROCEEDINGS	Arndt, C M	Cockpit Automation Design Issues and Recommendations
94374	A225188	TECHNICAL REPORT	Schlegel, R E Gilliland, K	Evaluation of the Criterion Task Set - Part I Appendices A and B -Univariate Summaries
94316	A224331	TECHNICAL REPORT	Schlegel, R E Gilliland, K	Evaluation of the Criterion Task Set - Part I CIS Performance and SWAT Data - Baseline Conditions
94367		OTHER - NEWSLETTER	Oen, J	New Contract Award

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: --- See Requirements List for Supported Tasks in Project 7184

CUSTOMERS: --- See Customers List for Supported Tasks in Project 7184

MAJOR EQUIPMENT:

FACILITIES: Building 248, Building 33, Building 29, Building 196

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NOTE: This task summary covers only administrative and support costs for an Operations and Maintenance contract that supports the entire project. Specific funding and products are listed under the individual workunits that supply funding to the contract.  
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## Crew Station Design Techniques and Criteria

TASK MANAGER: Maris M Vikmanis  
HEG - AV 785-7586

TASK NUMBER; 718408

### OBJECTIVES:

1. To advance methods for defining the multidimensional size, shape, strength, and functional characteristics of humans.
2. To develop engineering tools and data bases for designers of cockpits, personal protective equipment, and clothing.
3. To assist the acquisition community in the design, specification, and testing of Air Force systems.

### BACKGROUND:

Anthropometric data is used by many Air Force organizations, for the design of cockpits, protective equipment, clothing, and crash test manikins for ejection research. A large collection of data from all over the world is maintained and utilized for these purposes at AAMRL/HEG. However, even though the collection is large, it is becoming increasingly insufficient for modern Air Force systems. Tape measures and calipers, once the state-of-the-art, are ineffective tools for measuring many things, simply cannot measure others, and measuring large numbers of dimensions is very costly and time consuming. For example, a sculptor or modeler would take the available information (usually approximately 30 points or measures per item) and fill in the remainder with an artistic interpretation of what the human face, hand, or torso etc. might look like. To achieve our goals of greater g-force tolerance, improved chemical and environmental protection, greater aircraft stealth, etc. it has become clear that we need to better define the human operator in our designs.

The need for a comprehensive up-to-date anthropometric data base has been expressed by persons from all of the major commands. The most active users will be the Life Support and aircraft SPO's.

The Harry G. Armstrong Aerospace Medical Research Laboratory (AAMRL) has a Memorandum of Agreement with the Air Force Human Resources Laboratory (AFHRL) to develop a computer-aided design (CAD) model of an aircraft maintenance technician called CREW CHIEF. This model is interfaced to existing commercial CAD systems used by aerospace manufacturers and may be used to evaluate the maintainability of Air Force aircraft. The major aerospace companies helped determine how the CREW CHIEF model could best help them do a better job. CREW CHIEF is actually an expert system which allows the designer to perform the functions of an expert ergonomist. The CREW CHIEF model will allow the designer to simulate a maintenance activity on the computer generated image of the design and determine if the required activities are feasible.

Approximately 35 percent of the lifetime cost of military systems is spent for maintenance. Excessive repair time is caused by failure of the system design to adequately consider maintenance. The maintenance technician will spend hours making a repair which could have been completed in minutes if accessibility had been adequate. The CREW CHIEF model will reduce the incidence of such problems by allowing the designer to perform maintainability analyses and correct design-related defects with the computer model.

## AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 718408

TASK TITLE: Crew Station Design Techniques and Criteria

MIS CATEGORY: Core

MANAGER: Vikmanis      OFFICE: HEG      PHONE: 57586      START: 01-OCT-76      STOP: 30-SEP-97      PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED		FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding							
Off-Site Contract Costs	811,706.00	850,000.00	581,000.00	576,000.00	100,000.00		2,918,706.00
On-Site Contract Costs	69,977.00	70,000.00	30,000.00	30,000.00	30,000.00		229,977.00
Civilian Salary Costs	163,280.50	195,320.96	207,001.38	228,454.50	337,715.00		1,131,772.34
Other Support Costs	57,913.85	13,202.51	14,219.09	15,626.79	17,486.37		118,448.61
Internal Funding Subtotal	1,102,877.35	1,128,523.47	832,220.47	850,081.29	485,201.37		4,398,903.95
External Funding							
Off-Site Contract Costs	524,540.00	500,000.00	.00	.00	.00		1,024,540.00
On-Site Contract Costs	20,000.00	.00	.00	.00	.00		20,000.00
Civilian Salary Costs	.00	.00	.00	.00	.00		.00
Other Support Costs	.00	3,000.00	.00	.00	.00		3,000.00
External Funding Subtotal	544,540.00	503,000.00	.00	.00	.00		1,047,540.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (		.00) (
Total Annual Costs	\$ 1,647,417.35	\$ 1,631,523.47	\$ 832,220.47	\$ 850,081.29	\$ 485,201.37	\$	5,446,443.95
In-House Labor Hours							
Aume	404	404	404	404	1322		2938
Greene	110	110	110	110			440
Linhart	294	294	522	522	1784		3416
McDaniel	706	706	706	706	1836		4660
Robinette	1316	1683	1683	1683	1683		8048
Summers	159	159	159	159	159		795
Vidulich	257	257	257	257			1028
Vikmanis	635	917	917	917	117		4303
Whitestone	1885	1886	1886	1886	86		5429
Yates	192	192	192	826	1398		2800
Zehner	1871	1871	1871	1871	1871		9355
Total Hours (Person-Years)	7829 (3.8)	8479 (4.1)	8707 (4.2)	9341 (4.5)	12856 (6.2)		47212

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
3005H102	AUTOMATED CUSTOM FIT PROD	Zehner	HEG	58812	10-AUG-89	08-JUN-90
7184081A	Support AFHRL/AAMRL MOA	McDaniel	HEG	52558	18-JUN-86	31-DEC-91
7184081B	ACCOMMODATION TOOL	McDaniel	HEG	52558	01-NOV-88	30-SEP-91
71840831	Human Physical Capabilities for AF Jobs	McDaniel	HEG	52558	01-OCT-76	30-SEP-95
71840840	SYSTEMS ANTHROPOMETRY	Kaleps	BBM	53665	22-JUN-83	30-MAR-90
71840841	Techniques for Workplace and Maintenance Evaluation	McDaniel	HEG	52558	01-FEB-84	10-SEP-90
71840842	Analysis of Human SFF	Robinette	HEG	58810	25-SEP-84	15-DEC-89
71840844	COMPUTER MDLS ERGONOMICS	McDaniel	HEG	52558	25-JAN-90	25-JAN-94
71840845	M-D Anthropometric A&E	Robinette	HEG	58810	12-MAR-90	12-MAR-93

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
71840850			Engineering Morphometrics	30-SEP-93
71840851			DOD ANTHROPOMETRICS	02-MAY-90
71840855			AUTOMATED ANTHRO METHODS	30-SEP-97
7184085B			DB Structure Development	30-SEP-91
7184085C			Summarization in 3D	30-SEP-91
7184085D			USN Women's Survey	30-SEP-91
7184085E			Stealth Heads	30-SEP-91
7184085F			FEMALE A/C STUDIES	31-DEC-89
7184085G			USA WOMEN'S SURVEY	31-DEC-89
7184085H			MBU-12/P Oxygen Mask	30-SEP-91
7184085I			Airline Seat Space Study	31-DEC-89
7184085J			HUMAN BODY DATA ANALYSIS	31-DEC-89
7184085K			STAT SHAPE SUMMARY-NVG	31-DEC-91
7184085L			TARIFF ANALYSIS STUDIES CWU66	31-DEC-92
7184085M			ANALYSIS STUDIES FOR THE CD AIRCREW ENSEMBLE(CWU-66P)	31-DEC-92
7184085N			ANTHRO EVALUATION OF TRAINER AC	31-DEC-92
7184085P			NAVAL BIODYNAMICS LABORATORY ANTHROPOMETRIC MEASUREMENTS	31-DEC-91
7184085Q			ANTHROPOMETRY PRODUCTS	31-DEC-96
718408AM			Anthropomorphic Measuring Technology	31-DEC-96
718408AS			Tri-Service Anthro Survey	31-DEC-90
718408HR			HRL Support for CrewChief	31-DEC-92
718408NN			Aviation Life Support System	30-NOV-93
718408TD			TRAVEL SUPPORT FOR SAIR	30-SEP-91
718408V1			NVG S/S DESIGN STUDY	31-DEC-92
718408V2			FIT ASSESSMENTS/PARAMETER	31-DEC-91

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005H1--	318.75	----	SUPPORT COSTS	HSD/6106MD
718408--	5850.52	----	TRAVEL EXPENSES	HSD/6106MD
718408--	6392.58	----	SUPPORT COSTS	HSD/6106MD
718408--	163280.50	----	SALARY COSTS	HSD/6106MD
7184081A	443000.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	AFHRL/AFHRL
7184081B	105402.00	F33615-86-D-0540	Engineering Support for Rapid Prototyping, Test, and Evaluation University of Dayton Research Institute	HSD/CAT
71840831	20000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71840842	40000.00	F33615-85-C-0531	Analysis of Human Size, Form, Function for Improving AF Systems Anthropology Research Project, Inc.	HSD/7184
71840844	31444.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	HSD/7184
71840844	100000.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	HSD/7184

71840844	237556.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	HSD/7184
71840845	13100.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/7184
71840845	22900.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/7184
71840845	34000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/7184
7184085E	20000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	NAVY/NAVY
7184085J	49977.00	F33615-87-C-0530	Biodynamic Model Interactive Data Base Support & Development Beecher Research Company	HSD/7184
7184085K	9100.00	-----	AF 616 HY-90-22 to AFIT/E	HSD/7184
7184085K	23616.00	-----	AAMRLB-90-00078/F3360090M	HSD/7184
7184085L	993.00	-----	AF FORM 616-90-HY-416/AAM	HSD/HSD
7184085L	993.00	-----	AF FORM 616-90-HY-416/AAM	HSD/HSD
7184085L	993.00	-----	AF FORM 616-90-HY-416/AAM	HSD/HSD
7184085L	9657.00	-----	AF FORM 616-90-HY-416/AAM	HSD/HSD
7184085L	51304.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/HSD
7184085M	2540.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/YAGD/ASD
7184085M	9000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/YAGD/ASD
7184085N	70000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	ASD/ASD
718408V1	33000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/VIC
718408V1	143000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/VIC
FY 90 TOTAL	1,647,417.35			

3005H1--	335.01	-----	SUPPORT COSTS	HSD/6106MD
718408--	6148.90	-----	TRAVEL EXPENSES	HSD/6106MD
718408--	6718.60	-----	SUPPORT COSTS	HSD/6106MD



718408--	195320.96	-----	SALARY COSTS	HSD/6106MD
7184081A	50000.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	AFHRL/AFHRL
71840844	100000.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	HSD/7184
71840844	275000.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	HSD/7184
71840845	21000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/7184
71840845	174000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/7184
71840850	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184085P	1500.00	-----	NAVY LTR DTD 7-MAR-91	NAVY/NAVY
7184085P	1500.00	-----	TOY/NAVY Letter Dated 7MA	NAVY/NAVY
718408V1	280000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/HMST
718408V2	20000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/HMST
FY 91 TOTAL	1,631,523.47			
3005H1--	360.80	-----	SUPPORT COSTS	HSD/6106MD
718408--	6622.36	-----	TRAVEL EXPENSES	HSD/6106MD
718408--	7235.93	-----	SUPPORT COSTS	HSD/6106MD
718408--	207001.38	-----	SALARY COSTS	HSD/6106MD
71840844	350000.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	HSD/7184
71840845	231000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/7184
71840850	30000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
FY 92 TOTAL	832,220.47			
3005H1--	396.52	-----	SUPPORT COSTS	HSD/6106MD

718408--	7277.98	-----	TRAVEL EXPENSES	HSD/6106MD
718408--	7952.29	-----	SUPPORT COSTS	HSD/6106MD
718408--	228454.50	-----	SALARY COSTS	HSD/6106MD
71840844	350000.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	HSD/7184
71840845	226000.00	F33615-89-C-0572	Human Morphometrics, Motion, and Performance Anthropology Research Project, Inc.	HSD/7184
71840850	30000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184

FY 93 TOTAL 850,081.29

3005H1--	443.71	-----	SUPPORT COSTS	HSD/6106MD
718408--	8144.05	-----	TRAVEL EXPENSES	HSD/6106MD
718408--	8898.61	-----	SUPPORT COSTS	HSD/6106MD
718408--	337715.00	-----	SALARY COSTS	HSD/6106MD
71840844	100000.00	F33615-89-C-0575	Pilot Performance A&M University of Dayton Research Institute	HSD/7184
71840850	30000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184

FY 94 TOTAL 495,201.37

5 YEAR TOTAL 5,446,443.95

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90328	A168485	TECHNICAL REPORT	Kennedy, K W	A Collation of United States Air Force Anthropometry
90088	A215173	TECHNICAL REPORT	Case, H Ervin, C Robinette, K M	Anthropometry of a Fit Test Sample Used in Evaluating the current and Improved MCU-2/P Masks
90277	A222735	TECHNICAL REPORT	McDaniel, J W Korna, M Kranskopf, P	User's Guide for COMBIMAN Programs (Computerized Biomedical Man-model) Version 8

Quinn, J

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

DESCRIPTION OF TECHNOLOGY TRANSITIONED

CUSTOMERS

NCSC, TTTS SPO, TAC/SG, NADC, ATF SPO,  
HSD/YA, CSERIAC, Flight Training SPO

Multivariate Specification & Evaluation Techniques, Sizing Systems

CSERIAC

CREW CHIEF - Version 1.1 (for Computervision Version CADDStation)

CSERIAC

CREW CHIEF - Version 2 (unhosted version)

CSERIAC

CREW CHIEF - Version 2 (for CADAM Version 21)

CSERIAC

COMBIMAN Version 8

CSERIAC

CREW CHIEF - Version 2 (for CATIA Version 3)

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: MOA AAMRL/HLR, ASCC WP-61, MIL-STD-1472, MIL-STD-1800, MIL-STD-1776, BEA HSD/YAG/CCCD, BEA HSD/YAG/HMST

CUSTOMERS: HQ USAF, HQ MAC, HQ ATC, USN, ASD/EN, US Army, USN/NBDL, MPC, CREST, HSD/YAG, AFSC/SG, F-16 SPO, Naval Coastal Sys Ctr (MANPRINT)

MAJOR EQUIPMENT: Dynamic Strength Test Cockpit, Laser Scanner, Sonic Digitizer, Maintenance Task Simulator

FACILITIES: Bldg 33, Rms 121 & 122, Bldg 29 (4000 sq ft in basement for ergonomics lab), Bldg 248 1st Floor

Strategic Avionics Crew Station Design Evaluation Facility (SACDEF)

TASK MANAGER: William P Marshak  
HED - AV 785-7555

TASK NUMBER: 718410

OBJECTIVES:

1. To optimize human performance in strategic aircraft.
2. To support operational requirements using research simulators.
3. To conduct research to establish criteria for controls, displays, workload, and images applicable to current and future aircraft.

BACKGROUND:

1. Missions are simulated using existing, proposed, and prototype crew stations to quantify improvements or reductions in operator effectiveness. This research supports operational requirements including SAC Statements of Operational Need (SON) 01-85 and 02-84; Program Management Directives 3032(2)/6422/F and (2901)/11126F; and the Memoranda of Agreement between HSD and SAC for the B-1B Engineering Research Simulator, between ASD and AAMRL for Strategic Conventional Standoff Capability and Strategic Relocatable Target Studies, and between ASD and AAMRL for B-1B studies.
2. Research on human interface criteria supports the SAC Statements of Operational Need on B-52 Conventional Weapon Integration (SAC SON 18-82) and the SAC Strategic Warfare Center (SAC SON 022-86), and Program Management Directive 2145 (24)/64738F, (Protective Systems).

TASK TITLE: Strategic Avionics Crew Station Design Evaluation Facility (SACDEF)

MIS CATEGORY: Thrust

MANAGER: Marshak OFFICE: HED PHONE: 57555 START: 01-JUL-72 STOP: 30-SEP-94 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	350,000.00	362,365.00	747,000.00	806,000.00	585,000.00	2,850,365.00
On-Site Contract Costs	673,112.00	459,000.00	410,000.00	500,000.00	360,000.00	2,402,112.00
Civilian Salary Costs	338,686.20	375,837.87	404,564.45	416,701.39	459,485.72	1,995,275.63
Other Support Costs	3,954.44	44,156.12	4,476.14	4,919.28	5,504.67	63,010.65
Internal Funding Subtotal	1,365,752.64	1,241,358.99	1,566,040.59	1,727,620.67	1,409,990.39	7,310,763.28
External Funding						
Off-Site Contract Costs	1,387,843.00	1,420,925.00	.00	.00	.00	3,308,768.00
On-Site Contract Costs	685,000.00	158,678.75	.00	.00	.00	843,678.75
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	2,572,843.00	1,579,603.75	.00	.00	.00	4,152,446.75
Unfunded Requirements	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Total Annual Costs	\$ 3,938,595.64	\$ 2,820,962.74	\$ 1,566,040.59	\$ 1,727,620.67	\$ 1,409,990.39	\$ 11,463,210.03
In-House Labor Hours						
Barson	1676	1476	1676	1676	1676	8180
Fix	88					88
Green	1690	1692	1692	1692	1692	8458
Kuperman	1874	1874	1874	1874	1874	9370
Lambert	94	1984	1984	1984	1984	8030
Marshak	487	478	478	478	582	2503
McFarren	1400					1400
McKechnie	1353	1456	1664	1664	1664	7801
McNeese	1756	1756	1756	1756	1756	8780
Mills	519	519	519	519	1239	3315
Monk	313	313	313	313	313	1565
Purvis	1400	1389	1693	1693	1893	8068
Sharp	1751	1751	1751	1751	1751	8755
Skelly	562	1249	1249	1249	1249	5558
St John	1153	1271	1471	1471	1471	1153
Stewart	1471	173	173	173	173	7155
Summers	173	1601	1601	1601	1601	865
Wilson	1601					8005
Total Hours (Person-Years)	19361 (9.3)	18982 (9.1)	19894 (9.6)	19894 (9.6)	20918 (10.1)	99049

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT  
7184100A SIM ANAL & EVAL  
7184100B Simulation Research

WORKUNIT TITLE

MONITOR  
Sharp  
Marshak

BRANCH  
HED  
HED

PHONE  
57559  
57555

START DATE  
24-FEB-86  
01-OCT-87

STOP DATE  
30-SEP-93  
30-SEP-92

7184100C B-1B ERS CLS  
71841010 Electronic Warfare Crew Station Design & Perf Assessment  
71841024 Nav/Bomb Nav Crew Station Design & Performance Assessment  
71841027 Flight Management Systems  
71841033 Radar Information Transfer Systems Analysis  
71841034 Cockpit Procedures INR  
71841038 Image Display Mensuration/Enhancement  
71841039 SACDEF  
7184103B HRR Workload Analyses  
7184103F Proof of Concept Studies  
7184103G SHORT-TERM MEMORY  
7184103H SRT TECH PANEL  
7184103I CONCEPT I DEMO SUPPORT  
7184103J SUPPORT OF PROJECT 3729  
7184103K ATARS TEST AND EVALUATION  
7184103L COMUSCENE IV A DBGS TRAINING  
71841041 STRATEGIC FORCE Management FOR Reliable Targets  
71841042 I1 IN Strategic C3I  
71841043 AIM SIGHT DISPLAYS  
71841044 ADVANCED STRATEGIC COCKPIT ENGINEERING  
71841045 Strat Crew Performance Enhancement  
71841046 Strat Information & Force Management  
7184104A Engineering Research Simulator  
7184104D STRATEGIC CRW SYSTEMS ANALYSIS  
7184104E SUPPORT OF 71841045  
7184104F SUPPORT OF 7184104F  
7184104G SUPPORT OF RAPID PROTO  
7184104H STRATEGIC MISSIONS  
7184104I B-2 COCKPIT EVALUATION FACILITY  
7184107C AIM Sight  
7184107D ADVANCE REFERENCE SYSTEM  
7184107E AN/APQ-175 RADAR SYSTEM  
7184107F MOCKUP MATERIAL SW/HW SRT  
7184107G NVC TRAINING DEVICE  
7184108A Information Management Assessment  
718410D3 B-1 DISPLAY FORMAT DEMO  
718410RT SUPPORT FOR SFM FOR RT'S

McKechnie  
Barson  
Green  
Purvis  
Kuperman  
Sharp  
Kuperman  
McKechnie  
Kuperman  
Wilson  
Kuperman  
Kuperman  
Kuperman  
Kuperman  
Marshall  
Wilson  
McFarren  
Purvis  
Kuperman  
Purvis  
Wilson  
Sharp  
Kuperman  
McKechnie  
McKechnie  
Kuperman  
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Purvis  
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Kuperman  
Kuperman  
Wilson

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25-OCT-89  
01-JUL-72  
01-FEB-75  
\*5-SEP-79  
30-SEP-92  
01-OCT-82  
01-NOV-83  
16-JAN-86  
15-MAY-86  
02-JUN-86  
01-APR-88  
01-OCT-88  
14-NOV-88  
08-MAY-89  
01-AUG-90  
01-AUG-90  
22-MAR-91  
01-OCT-87  
01-OCT-88  
01-OCT-88  
01-SEP-89  
01-SEP-89  
01-SEP-89  
22-APR-86  
08-JAN-90  
30-SEP-90  
30-SEP-90  
30-OCT-90  
13-MAY-91  
13-JUN-91  
18-APR-88  
20-APR-89  
\*9-JUL-90  
10-AUG-90  
18-JUN-91  
01-OCT-87  
13-JAN-87  
21-FEB-89

30-SEP-92  
30-SEP-92  
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30-SEP-92  
14-JAN-93  
31-DEC-89  
31-DEC-91  
31-DEC-91  
31-DEC-92  
30-SEP-91  
30-SEP-94  
31-DEC-93  
31-DEC-91  
30-SEP-92  
30-SEP-92  
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31-DEC-92  
30-SEP-92  
31-DEC-92  
30-SEP-91  
30-SEP-91  
31-DEC-91  
31-DEC-91  
30-SEP-90  
31-DEC-92  
31-DEC-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
718410--	3954.44	----	SUPPORT COSTS	HSD/6106MD
718410--	338686.20	----	SALARY COSTS	HSD/6106MD
7184100A	426564.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	ASD/ASD
7184100C	1271279.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	SAC/SAC
71841039	25000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	HSD/7184

71841035	282000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	WRDC/WRDC
71841036	73000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ASD/ASD
71841037	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ASD/ASD
71841038	280000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ASD/ASD
71841044	95556.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841044	700000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841044	332556.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841045	300000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	HSD/7184
71841045	310000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	HSD/7184
71841046	95000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841046	115000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	HSD/7184
7184104D	250000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/CAT
7184107F	75000.00	F33615-88-D-0536	System Engineering for Modeling/Simulation Research UNISYS Corporation	ASD/ASD
7184107F	115000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	ASD/ASD
FY 90 TOTAL	3,938,595.64			
718410--	4156.12	----	SUPPORT COSTS	HSD/6106MD
718410--	388840.24	----	SALARY COSTS	HSD/6106MD
7184100A	105000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	ASP/ASD/RWPF
7184100A	226900.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	ASD/ASD
7184100C	207025.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	SAC/DOSF, SAC

7184100C	680000.00	F33615-87-C-0531	Science Applications International Corp System Engineering Design and Technical Science Applications International Corp	SAC/DOSP/SAC
7184103K	91678.75	F33615-89-C-0532	Engineering Support LOGICON, Inc	ASD/ASD
7184103L	2000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	WL/WL
71841044	35000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841044	260000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841045	3000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841045	21000.00	F33615-87-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841045	45000.00	F33615-87-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841046	45000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841046	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184104E	2284.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	HSD/7184
7184104E	10021.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	HSD/7184
7184104E	40000.00	-----	AF FORM 616 TO HILL AFB/H	HSD/7184
7184104E	105000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	HSD/7184
7184104E	130000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	HSD/7184
7184104F	95000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	HSD/7184
7184104G	20000.00	F33615-91-P-0008	Proto of HET Technologies	HSD/7184
7184104H	67000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	ESD/ESD
7184104G	200000.00	F33615-87-C-0531	System Engineering Design and Technical Science Applications International Corp	ATLC/ATLC



FY 91 TOTAL 2,833,965.11				
718410--	4476.14	----	SUPPORT COSTS	HSD/6106MD
718410--	409003.77	----	SALARY COSTS	HSD/6106MD
71841044	410000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184104E	597000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/7184
7184104G	150000.00	F33615-91-P-0008	Proto of HET Technologies	HSD/7184
FY 92 TOTAL 1,570,479.91				
718410--	4919.28	----	SUPPORT COSTS	HSD/6106MD
718410--	421273.89	----	SALARY COSTS	HSD/6106MD
71841044	500000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184104E	606000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/7184
7184104G	200000.00	F33615-91-P-0008	Proto of HET Technologies	HSD/7184
FY 93 TOTAL 1,732,193.17				
718410--	5504.67	----	SUPPORT COSTS	HSD/6106MD
718410--	459485.72	----	SALARY COSTS	HSD/6106MD
71841044	360000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184104E	455000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/7184
7184104F	130000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/7184
FY 94 TOTAL 1,409,990.39				
5 YEAR TOTAL 11,485,224.22				

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90056		ABSTRACT	Reynolds, M C Purvis, B D Marshak, W P	A Demnstration/Evaluation of B-1B Flight Director Computer Control Laws: A Pilot Performance Study
90209		ORAL PRESENTATION	Tan, K C	A Quantitative Comparison of Memory Loading as a Function of Stimulus Class
90192		PROCEEDINGS	St. John, R J Purvis, B D	AIM Sight
90193		ORAL PRESENTATION	St. John, R J Purvis, B D	AIM Sight
90054		ABSTRACT	Fix, E L Marshak, W P Burnside, D	Advanced Reference System Cockpit Display Design Project
90105		PROCEEDINGS	Fix, E L Marshak, W P Burnsides, D	Advanced Reference System Cockpit Display Design Project
90200	A218143	TECHNICAL REPORT	McNeese, M D	Cerebral Weevil: A Machine Learning Model for Hemispheric Categorization of Complex Visual Patterns
90085	A214512L	TECHNICAL REPORT	Wilson, D L Kuperman, G C	Effects of ATARS Image Compression on Image Interpretability Ratings
90206	A218549	TECHNICAL REPORT	McNeese, M D	Explorations in Cooperative Systems: Thinking Collectively to Learn Individually to Think
90143		ORAL PRESENTATION	Kuperman, G G	Laboratory Capability in Support of New Operational Requirements Generated by New Avionics
90152	A217739	TECHNICAL REPORT	McNeese, M D Katsuyama, R M	Lateral Asymmetry in Pattern Recognition: Understanding the Effects of Familiarity, Distinction, an
90198	A219302	TECHNICAL REPORT	Gonsalves, P G Kneiler, E W Zacharias, G L	Model-Based Method for Terrain-Following Display Design
90208		ORAL PRESENTATION	Kahn, M J	Reduction of Cognitive Workload Through Information Chunking
90203	A217675	TECHNICAL REPORT	McNeese, M D	The Boundaries of Hemispheric Processing In Visual Pattern Recognition
90153	C956972L	TECHNICAL REPORT	Kuperman, G C Wilson, D L Crawford, R	Wide Dynamic Range Synthetic Aperture Radar Operator Performance Display Study (U)

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
Rockwell International Corp./Collins Gov't Avionic LCD Instrument		Marshak
Rockwell International Corp/Avionics Advanced Tech Artificial Intelligence Applications		McNeese
Rockwell International Corp/Avionics Advanced Tech Advanced Crew Station Concepts		Kuperman
Rockwell International Corp/Collins Defense Comm	Command and Control Technology	McFarren
Rockwell International, North American Aircraft	Technical Demonstration - Situation Awareness	Marshak
Rockwell International, North American Aircraft	Technical Demonstration - Situation Awareness	Kuperman
Rockwell International, North American Aircraft	Advanced Cockpit Integration	Kuperman
Rockwell International North American Aircraft	Advanced Strategic Aircraft, B-1B, Avionics Enhanc	Kuperman
Ford Aerospace, Colorado Springs Division	Computer Assisted Instruction for C2 Systems	Marshak
Ford Aerospace, Colorado Springs Division	Cooperating Intelligent Systems	McNeese
Ford Aerospace, Colorado Springs Division	Advanced Tactical C2 Information Systems	McFarren
Ford Aerospace Corporation, Space Missions Group	Automated Space Mission Support	McFarren
Lockheed Missiles & Space Co., Inc. - R&D Division	C3I Research	McFarren
Lockheed Missiles & Space Co., Inc. - R&D Division	Knowledge Representations for Robotic Systems	McNeese
Lockheed Missiles & Space Co., Inc. - R&D Division	Image Understanding	Wilson
Lockheed Missiles & Space Co., Inc. - R&D Division	Generic Expert Systems	McNeese
Lockheed Missiles & Space Co., Inc. - R&D Division	Intelligent Interfaces	Kuperman
Lockheed Missiles & Space Co., Inc. - R&D Division	Realtime Symbolic Processing Architectures	Kuperman

IBM Systems Integration Division	Decision Support Information Systems	McNeese
IBM Systems Integration Division	Expert Systems for Real-Time Command and Control	McFarren
IBM Systems Integration Division	Display Systems Architecture	Wilson
TRW Space & Defense Sector, Systems Integration Grp	Battle Management C3 Technology	McFarren
TRW Space & Defense Sector, Systems Integration Grp	Advanced Man-Machine/User Interface for Command, Et	McNeese
General Dynamics Corp - Electronics Division	Communication System Real-Time Software Analysis	Wilson
General Dynamics Corp - Electronics Division	Command and Control Systems Development: Data Fusio	Wilson
GE Aerospace/Automated Systems Dept., GE Company	C3I Systems Studies	McNeese
Northrop Corporation, Aircraft Division	Tactical Cruise Missile Sensor-Suite Technology	Kuperman
Boeing Military Airplanes	Offensive Avionics Systems	Kuperman

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: MOAS SAC/HSD/AAMRL for ERS, AAMRL/ASD for SCSC and SRT, AAMRL/ASD for B-1, SAC SONS 06-79, 05-80, 10-81, 11-81, 12-81, 18-82, 02-84, 01-85; TAF SONS 302-81, 307-81; TAF GOR 304-78, PMD 3032(2)/64227F(2901)/11126F

CUSTOMERS: AFWAL/AAR, Army HEL, ASD/SD/B-1B, ASD/RW, HQ SAC/XO, HQ SAC/DO, HQ SAC/XP

MAJOR EQUIPMENT: Engineering Research Simulator (ERS), Color Display Generation System, B-52 Defensive Crew Station, B-52 Flight Station, Visual Image Processing Enh & Reconstruction Lab (VIPER), SABER, HIFI DSO Sim

FACILITIES: Building 248 (Vault B03, Room B08, Room 101), Building 33 (First Floor Lab)

## Design Parameters for Visually-Coupled and Visual Display Systems

TASK MANAGER: Dean F Kocian  
HEA - AV 785-8904

TASK NUMBER: 718411

### OBJECTIVES:

1. To develop design and evaluation criteria for display and control technologies which optimize the interface between the crew member and the avionics.
2. To provide performance baselines for future systems by developing prototypes of advanced components and subsystems using advanced control and display devices, such as Helmet Mounted Sights and Displays (HMS/D), coupled with auditory and tactile interface media, all of which provide for three dimensional (3D) control and display of information within a 4-pi steradian virtual world.
3. To construct appropriate specialized test instrumentation and conduct hardware oriented quantitative testing of virtual interface systems and components in ground-based and airborne operating environments.
4. To investigate in detail the areas defined by the following five work units: Advanced Visually Coupled Systems and Display Concepts, Color Display Laboratory, Miniature Color Display, Enhanced Computer Algorithms, and Design Evaluation of Visually-Coupled Systems.

### BACKGROUND:

Design criteria are developed on the basis of psychophysical theory, human performance data, measurements/assessments of inhouse and outside organizations' relevant hardware, and realistic evaluations of current and future system performance. The state-of-the-art has been advanced by Visually-Coupled Systems (VCS), which allow research to be pursued further than previously possible. Component technology developments under the program which will directly feed the Super Cockpit program are being initiated under this task as a natural continuity of VCS and virtual display system developments.

## TASK TITLE: Design Parameters for Visually-Coupled and Visual Display Systems

MIS CATEGORY: Core

MANAGER: Kocian OFFICE: HEA PHONE: 58904 START: 01-OCT-80 STOP: 30-SEP-95 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
<b>Internal Funding</b>						
Off-Site Contract Costs	329,924.00	514,000.00	360,000.00	210,000.00	.00	1,413,924.00
On-Site Contract Costs	1,577,136.00	1,277,800.00	888,000.00	1,096,000.00	1,157,000.00	5,995,936.00
Civilian Salary Costs	234,753.10	224,672.01	231,412.17	230,150.02	131,223.87	1,052,211.17
Other Support Costs	5,397.47	5,672.75	6,109.54	6,714.38	7,513.40	31,407.54
<b>Internal Funding Subtotal</b>	<b>2,147,210.57</b>	<b>2,022,144.76</b>	<b>1,485,521.71</b>	<b>1,542,864.40</b>	<b>1,295,737.27</b>	<b>8,493,478.71</b>
<b>External Funding</b>						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	2,000.00	296,000.00	.00	.00	.00	298,000.00
Civilian Salary Costs	.00	6,757.00	.00	.00	.00	6,757.00
Other Support Costs	8,000.00	.00	.00	.00	.00	8,000.00
<b>External Funding Subtotal</b>	<b>10,000.00</b>	<b>302,757.00</b>	<b>.00</b>	<b>.00</b>	<b>.00</b>	<b>312,757.00</b>
<b>Unfunded Requirements</b>	<b>( .00 ) ( .00 ) ( .00 ) ( .00 ) ( .00 ) ( .00 )</b>					
<b>Total Annual Costs</b>	<b>\$ 2,157,210.57</b>	<b>\$ 2,324,901.76</b>	<b>\$ 1,485,521.71</b>	<b>\$ 1,542,864.40</b>	<b>\$ 1,295,737.27</b>	<b>\$ 8,806,235.71</b>
<b>In-House Labor Hours</b>						
Beard (MILITARY)	1643	1814	1814	1814	1856	8941
Campbell (MILITARY)	1240	1240	1240	1240	1792	6752
Goins (MILITARY)	1468					1468
Haas	140					140
Kocian	1585	1585	1585	1354		6109
Martin	747	747	747	747	1039	4027
Ortiz	920	920	920	920	1822	5502
Post	1797	1590	1590	1590		6567
Russell	537					537
Self	1657	1657	1657	1657	921	7549
Straub	1136	168	168	168	189	1829
Task	37	37	37	37		148
Tsou	1672	1767	1767	1767	1809	8782
Valencia	70					70
<b>Total Hours (Person-Years)</b>	<b>14649 (7.0)</b>	<b>11525 (5.5)</b>	<b>11525 (5.5)</b>	<b>11294 (5.4)</b>	<b>9428 (4.5)</b>	<b>58421</b>

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
3005H105	LIQUID-CRYSTAL LENS	Post	HEA	57597	23-JUL-90	23-MAY-91
3005H106	DIFFRACTIVE OPTICS-HELMET MOUNTED DISPLAY	Kocian	HEA	58904	24-SEP-90	20-FEB-91
3005H107	OCULAR VERGENCE & ACCOMMODATION SENSOR FOR HMD	Tsou	HEA	58896	22-MAR-91	30-JUN-92
71841146	Advanced Visually Coupled System and Display Concepts	Kocian	HEA	58904	01-OCT-80	30-SEP-95
71841149	Color Display Design Criteria	Post	HEA	57597	01-OCT-83	30-SEP-93
71841155	Miniature Color Display	Post	HEA	57597	31-MAY-91	31-MAY-93

71841156	Advanced Eye Control System	Valencia	HEA	57594	01-OCT-88	30-SEP-94
71841157	QUATERION COMPUTER ALGOR	Kocian	HEA	58904	12-JUL-88	17-JUN-92
71841158	DESIGN EVALUATION OF VCS	Tsou	HEA	58896	01-SEP-88	30-SEP-93
71841159	VAR TRANSMITTANCE VISOR	Post	HEA	57597	21-MAY-91	21-AUG-92
71841160	Support for HCVD	Furness	HEA	57602	01-JUL-86	30-SEP-90
71841161	IHADSS Disp Adjust Panels	Furness	HEA	57602	18-JUL-86	31-DEC-92
71841162	VIRTUAL TACTILE DISPLAY SYSTEM	Calhoun	HEA	57595	01-OCT-88	31-DEC-94
71841163	VISUALLY COUPLED TACTICAL INTERNETTING SYSTEYEM	Valencia	HEA	58904	04-AUG-86	31-DEC-92
71841164	Biocybernetic Tracking Technology	Valencia	HEA	57594	01-OCT-86	31-DEC-92
71841165	AHPOMS	Kocian	HEA	58904	01-OCT-92	31-DEC-94
71841166	VC Component Technology	Kocian	HEA	58904	01-OCT-87	30-SEP-91
71841167	Miniature Image Source Technology (Color)	Post	HEA	57597	01-OCT-86	30-SEP-91
71841168	COMBINER DISPLAY	Linhart	HEX	57573	03-APR-89	31-DEC-92
71841169	Advanced HMD Electric Software Development	Straub	HEA	54046	16-MAR-88	30-SEP-91
71841170	HM BINOCULAR DISPLAY SYS	Kocian	HEA	58904	19-APR-88	31-DEC-92
71841171	HELMET MOUNTED DISPLAY DEVELOPMENT	Kocian	HEA	58904	24-JAN-90	30-SEP-91
71841172	LIGHT HELICOPTER PROGRAM	Kocian	HEA	58904	01-JUN-89	30-SEP-91
71841173	TRAVEL SUPPORT	Redwine Smith	HEX	58853	2-MAR-89	31-DEC-90
71841174	SUPPORT YAH-HMSI TASKS	Kocian	HEA	58904	11-JAN-90	31-DEC-92
71841175	MINIATURE CRIS	Kocian	HEA	58904	26-SEP-88	30-SEP-91
71841176	VPD AIRBORNE HARDWARE	Kocian	HEA	58904	07-OCT-88	31-DEC-92
71841177	INTEGRATED BINOCULAR HMD	Kocian	HEA	58904	07-DEC-88	31-DEC-92
71841178	VPD CONTROLLER	Kocian	HEA	58904	07-DEC-88	31-DEC-92
71841179	M-A-D ELECTRONICS	Kocian	HEA	58904	07-DEC-88	31-DEC-92
71841180	FOB FACEPLATES	Kocian	HEA	58904	07-DEC-88	31-DEC-92
71841181	SUP/HARDWARE SPARE PARTS	Kocian	HEA	58904	07-DEC-88	31-DEC-92
71841182	HI VOLT QUICK DISCONNECT	Kocian	HEA	58904	23-MAY-89	31-DEC-92
71841183	OPTICAL SYS. PRED'N MODEL	Tsou	HEA	58896	13-JUN-89	31-DEC-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005H1--	318.75	----	SUPPORT COSTS	HSD/6106MD
3005H105	48195.00	F41622-90-C-1010	Liquid Crystal Switchable Kinoform Lenses for Combiner Displays Kinophase	HSD/3005
3005H106	49729.00	F41622-90-C-1013	Surface-Relief Diffractive Optics to Helmet Mounted Displays Rochester Photonics Corp.	HSD/3005
718411--	336.58	----	SUPPORT COSTS	HSD/6106MD
718411--	4742.14	----	TRAVEL EXPENSES	HSD/6106MD
718411--	234753.10	----	SALARY COSTS	HSD/6106MD
71841146	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841146	808528.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841149	105884.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184

71841158	77647.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841159	152941.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184116L	2000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	NAVY/NAVY
7184116L	8000.00	-----	JM0022 NAVY MIPR N6600190	NAVY/NAVY
718411V0	250000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/VIC
718411V8	40000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	HSD/HSD
718411V8	82136.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/VIC
718411V8	192000.00	F33615-86-D-0540	Engineering Support for Rapid Prototyping, Test, and Evaluation University of Dayton Research Institute	HSD/VIC
FY 90 TOTAL 2,157,210.57				
-----				
3005H1--	335.01	-----	SUPPORT COSTS	HSD/6106MD
3005H107	50000.00	F41624-91-P-0014	Ocular Vergence & Accommodation Sensor For Helmet-Mounted Display Applied Modern Technologies Corp	HSD/3005
718411--	353.75	-----	SUPPORT COSTS	HSD/6106MD
718411--	4983.99	-----	TRAVEL EXPENSES	HSD/6106MD
718411--	231314.80	-----	SALARY COSTS	HSD/6106MD
71841146	20636.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841146	60000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841146	66000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841146	402364.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841149	85000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841155	210000.00	F33615-91-C-0534	Miniature Color Display Honeywell, Inc (Systems&Research Center)	HSD/7184
71841158	165000.00	F33615-89-C-0532	Engineering Support	HSD/7184



71841159	92000.00	F33615-91-C-0533	LOGICON, Inc Variable Transmittance Visor Canadian Commercial Corp	HSD/7184
7184116F	2000.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	HSD/7184
7184116F	52000.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	HSD/7184
718411LH	6757.00	-----	JM8053 ARMY MIPR 4E-1-E80	ARMY/ARMY
718411V0	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/HMST
718411V0	144800.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/HMST
718411V3	296000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/YAH/HMST
718411V8	49000.00	F33615-86-D-0540	Engineering Support for Rapid Prototyping, Test, and Evaluation University of Dayton Research Institute	HSD/HMST
718411V8	59000.00	F33615-86-D-0540	Engineering Support for Rapid Prototyping, Test, and Evaluation University of Dayton Research Institute	HSD/HMST
718411V8	284000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/HMST

FY 91 TOTAL 2,331,544.55

3005H1--	360.80	-----	SUPPORT COSTS	HSD/6106MD
718411--	380.98	-----	SUPPORT COSTS	HSD/6106MD
718411--	5367.76	-----	TRAVEL EXPENSES	HSD/6106MD
718411--	238254.25	-----	SALARY COSTS	HSD/6106MD
71841146	493000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841149	85000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841155	280000.00	F33615-91-C-0533	Variable Transmittance Visor Canadian Commercial Corp	HSD/7184
71841158	310000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841159	80000.00	F33615-91-C-0533	Variable Transmittance Visor Canadian Commercial Corp	HSD/7184

FY 92 TOTAL 1,492,363.79

3005H1--	396.52	----	SUPPORT COSTS	HSD/6106MD
718411--	418.70	----	SUPPORT COSTS	HSD/6106MD
718411--	5899.16	----	TRAVEL EXPENSES	HSD/6106MD
718411--	237197.35	----	SALARY COSTS	HSD/6106MD
71841146	611000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841149	485000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841155	210000.00	F33615-91-C-0533	Variable Transmittance Visor Canadian Commercial Corp	HSD/7184

FY 93 TOTAL 1,549,911.73

3005H1--	443.71	----	SUPPORT COSTS	HSD/6106MD
718411--	468.53	----	SUPPORT COSTS	HSD/6106MD
718411--	6601.16	----	TRAVEL EXPENSES	HSD/6106MD
718411--	161250.01	----	SALARY COSTS	HSD/6106MD
71841146	579000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841149	300000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841158	278000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184

FY 94 TOTAL 1,325,763.41

5 YEAR TOTAL 8,856,794.05

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE

90156	DRAFT TR	Self, H C	A Tutorial on the Angular Positions and Velocities of Ground Objects Viewed from Aircraft
90035	ABSTRACT	Tsou, B H Kocian, D F Campbell, R H	Helmet-Mounted Display Testing
90221	ORAL PRESENTATION	Calhoun, C S Post, D L	Heterochromatic Brightness Matches via Ware and Cowan's Luminance Correction Equation
90240	ABSTRACT	Tsou, B H Rogers-Adams, B M	The Effect of Aspect Ratio on Helmet-Mounted Display Field-of-View
90337	ABSTRACT	Tsou, B H Rogers-Adams, B M	Visually-Coupled Target Acquisition as it Applies to Fitts' Law

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY		IRAD TOPIC	EVALUATOR
CAE-Link Corp, Link Flight Simulation Div	ADAPT		Tsou
CAE-Link Corp, Link Flight Simulation Div	Enhancements to the ATACDIG Visual Systems		Tsou
CAE-Link Corp, Link Flight Simulation Div	Data Base Generation Technology		Tsou
CAE-Link Corp, Link Flight Simulation Div	MOD-DIG Texture Enhancement		Tsou
CAE-Link Corp, Link Flight Simulation Div	Photomapped Supertexture for the Modular Digital I		Tsou
CAE-Link Corp, Link Flight Simulation Div	Advanced Modular Video Processor		Tsou
CAE-Link Corp, Link Flight Simulation Div	Helmet-Mounted Tactical Display		Tsou
CAE-Link Corp, Link Flight Simulation Div	Stimulated Avionics Interface Systems (SAIS)		Tsou
CAE-Link Corp, Link Flight Simulation Div	Micro Simulation Technology Simulation Design (MST		Tsou
CAE-Link Corp, Link Flight Simulation Div	Architecture, Concepts, and Tools for Simulation		Tsou
CAE-Link Corp, Link Flight Simulation Div	Ada Implementation in Simulators		Tsou
CAE-Link Corp, Link Flight Simulation Div	Helicopter Aerodynamics Model		Tsou

CAE-Link Corp, Link Flight Simulation Div	Programmable Parallel Processor DRLMS	Tsou
CAE-Link Corp, Link Flight Simulation Div	Simulator Net Working	Tsou
CAE-Link Corp, Link Flight Simulation Div	Force Level Simulation	Tsou
CAE-Link Corp, Link Flight Simulation Div	Aircraft Wide-Angle Reflective Display System	Tsou
Rockwell, Collins Defense Communications	Optical Detector Technology	Tsou
Ford Aerospace Corporation, Space Missions Group	Laser Head-Up Display	Tsou
McDonnell Aircraft Company	Sensor Technology	Tsou
Honeywell Defense Avionics Systems Division	Advanced Digital Imaging Systems	Kocian
Honeywell Defense Avionics Systems Division	Advanced Displays Development	Post
Honeywell Defense Avionics Systems Division	Military Flat Panel Displays	Post
Honeywell Defense Avionics Systems Division	Imaging System Component Design	Post
IBM System Integration Division	Advanced Space Flight Simulation Environment	Centers
Martin Marietta Corp., Electronics & Missiles Group	Advanced Pilotage	Tsou
Honeywell, Inc., Military Avionics Division	Optical Developments for Visually-Coupled Systems	Kocian
Honeywell, Inc., Military Avionics Division	Electronic Developments for Visually Coupled Sys	Kocian
AAT Corporation	Sensor Technology	Tsou
Hughes Danbury Optical Systems, Inc.	Expert Systems for Optical Design	Tsou
Hughes Aircraft Company, Radar Systems Group	Helmet Visor Displays	Tsou
Hughes Aircraft Company, Industrial Electronics Gr	Display Development	Kocian
Northrop Corporation, Aircraft Division	Advanced Avionics Laboratory Development	Straub
General Dynamics, Fort Worth Division	Advanced Cockpits Crew Accommodation	Tsou
General Dynamics, Fort Worth Division	Aircraft Crew Station Design	Post
General Electric, Simulation & Control Systems	Advanced CIG Display Systems	Tsou
McDonnell Douglas Training Systems	Rapid-Response Multi-Sensor Imaging Simulation	Tsou
McDonnell Douglas Training Systems	Visual/Sensor Display Systems Technology Integrat.	Tsou
Honeywell, Inc., Systems and Research Center	Optical Sensor Technology	Tsou
Honeywell, Inc., Systems and Research Center	Projection Displays	Tsou
Honeywell, Inc., SRC	Display Human Factors	Post
Allied-Signal Aerospace Co., Bendix Flight Sys. Div.	Helmet-Mounted Display Development	Kocian

<p>             Allied-Signal Aerospace Company              General Electric, Simulation &amp; Control Systems              Boeing Aerospace and Electronics              Westinghouse Electric Corp., Electronic Sys Group              Westinghouse Electric Corp., Science &amp; Tech Ctr           </p>	<p>             Flat Panel Displays(Digital Flight/Engine Displays              CIG Database and Application Systems              Advanced Flight Control Systems Development              Logistics Test for Electro-Optical Systems              Sensor Applications &amp; Advance Communication Sys           </p>	<p>             Post              Tsou              Straub              Tsou              Beard           </p>
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\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: IAF SON 302-81 (Night Attack Capabilities), IAF GOR 304-78 (Autonomous All-Weather Strike)  
 CUSTOMERS: ASD/FN, AFWAI/AA, AFWAI/FL, US Army LHX Program Office, NASA, MAC, ASD/YP, ASD/SD  
 MAJOR EQUIPMENT: AVCS, CRT/HMDIS, VCASS, Helmet Mounted Oculometer facility  
 FACILITIES: Building 243

Human Engineering Applications to Systems Design, Test, and Evaluation

TASK MANAGER: Kenneth R Boff  
HEX - AV 785-7596

TASK NUMBER: 718412

OBJECTIVES:

1. To provide human engineering applications, support, and consultation at all stages of systems acquisition.
2. To convert human engineering research data into the forms necessary for effective technology transfer such as military specifications, military standards, military handbooks, and engineering design data packages.
3. To perform research as necessary to provide methodological tools and techniques required to accomplish the integration of human engineering principles and criteria into the acquisition of Air Force systems.

BACKGROUND:

Research is conducted as appropriate to accomplish the mission of the Human Engineering Division and to respond to requests by users. User requirements that are supported include Program Management Directives (such as PMD AFSC/SOAE for Chemical Defense Equipment), Memoranda of Agreement (MOA) with users, and user test plans.

TASK TITLE: Human Engineering Applications to Systems Design, Test, and Evaluation

MIS CATEGORY: Core

MANAGER: Boff OFFICE: HEX PHONE: 57596 START: 02-DEC-74 STOP: 30-SEP-95 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	38,000.00	5,000.00	.00	.00	.00	43,000.00
On-Site Contract Costs	239,556.00	190,895.00	280,000.00	285,000.00	295,000.00	1,290,451.00
Civilian Salary Costs	142,151.90	150,708.13	155,229.37	200,001.28	225,348.95	873,439.63
Other Support Costs	13,082.10	3,239.29	220,488.71	269,834.09	354,290.35	863,934.54
Internal Funding Subtotal	432,790.00	349,842.42	655,718.08	754,835.37	874,639.30	3,067,825.17
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	20,517.00	.00	.00	.00	20,517.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	469,483.00	.00	.00	.00	469,483.00
External Funding Subtotal	.00	490,000.00	.00	.00	.00	490,000.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 432,790.00	\$ 839,842.42	\$ 655,718.08	\$ 754,835.37	\$ 874,639.30	\$ 3,557,825.17
In-House Labor Hours						
Boff	1320	1318	1318	1796	1796	7548
Centers	1160	1159	1159	1159	1583	6220
Ellifritt	617	620	620	909	909	3675
Green	32					32
Greene	576	576	576	576	576	2880
Hann	1259	1259	1259	1785	1785	7347
Irish	940	1589	1589	1589	1589	7296
Monk	1332	1332	1332	1464	1464	6924
Morton	1085					1085
Patrick	97					97
Summers	242	242	242	361	553	1640
Total Hours (Person-Years)	8660 (4.2)	8095 (3.9)	8095 (3.9)	9639 (4.6)	10255 (4.9)	44744

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK. \*\*\*\*\*

## WORKUNIT WORKUNIT TITLE

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
71841206	Military Specs and Standards	McDaniel	HEG	52558	01-OCT-76	30-SEP-92
71841221	DEFTech Laboratory	Irish	HEX	58801	01-OCT-87	30-SEP-94
71841222	CSERIAC	Irish	HEX	58801	01-OCT-87	30-SEP-94
71841223	Smart Specs	Monk	HEX	58814	01-OCT-92	30-DEC-93
71841224	CASHE	Monk	HEX	58814	01-SEP-90	30-SEP-95
7184122A	SUPPORT OF 71841221	Ellifritt	HEX	58868	30-SEP-90	31-DEC-92
7184122B	CASHE DEVELOPMENT	Monk	HEX	58814	29-NOV-90	31-DEC-92
7184125K	Night Vision Gogle (HUD) FOT&E	Craig	HEF	57592	27-AUG-87	31-DEC-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
718412--	3082.10	----	TRAVEL EXPENSES	HSD/6106MD
718412--	142151.90	----	SALARY COSTS	HSD/6106MD
71841221	38000.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	HSD/7184
71841221	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841221	189556.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841222	10000.00	----	MIPR FQ7624-90-00041 TO D	HSD/7184

FY 90 TOTAL 432,790.00

718412--	3239.29	----	TRAVEL EXPENSES	HSD/6106MD
718412--	150708.13	----	SALARY COSTS	HSD/6106MD
71841221	190895.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184122A	5000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis for SACDEF Science Applications International Corp	HSD/7184
7184122A	5000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	FAA/FAA
7184122B	15517.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	FAA/FAA
7184122B	224483.00	----	JM2068 DTFA01-90-Z-02068	FAA/FAA
7184122B	245000.00	----	JM2068 MIPR FY7615-91-05	FAA/FAA

FY 91 TOTAL 839,842.42

718412--	3488.71	----	TRAVEL EXPENSES	HSD/6106MD
718412--	155229.37	----	SALARY COSTS	HSD/6106MD
71841221	280000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841222	157000.00	----	MIPR - CSERIAC	HSD/7184



71841224	60000.00	----	CASHE	HSD/7184
FY 92 TOTAL 655,718.08				
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718412--	3834.09	----	TRAVEL EXPENSES	HSD/6106MD
718412--	200001.28	----	SALARY COSTS	HSD/6106MD
71841221	285000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841222	100000.00	----	MIPR TO DESC FOR CSERIAC	HSD/7184
71841224	166000.00	----	CASHE	HSD/7184
FY 93 TOTAL	754,835.37	-----		
-----				
718412--	4290.35	----	TRAVEL EXPENSES	HSD/6106MD
718412--	225348.95	----	SALARY COSTS	HSD/6106MD
71841221	295000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841222	100000.00	----	MIPR TO DESC FOR CSERIAC	HSD/7184
71841224	250000.00	----	CASHE	HSD/7184
FY 94 TOTAL	874,639.30	-----		

5 YEAR TOTAL 3,557,825.17

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

FY 90	240000.00	COST	TITLE / PAYOFF / PARTIAL COSTS
TITLE: Integrated Human Performance Model			
PAYOFF: Tremendous potential return on investment through development of a new generation of crew system design support tools and methodologies.			
PARTIAL COSTS:			

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90253		PROCEEDINGS	Swierenga, S J	A Comparison of Mouse, Trackball, and Joystick Performance Using Text-Editing and Tracking Tasks
90254		ORAL PRESENTATION	Swierenga, S J	A Comparison of Mouse, Trackball, and Joystick Performance

				Using Text-Editing and Tracking Tasks
90171	ABSTRACT	Swierenga, S Boff, K Morton, K		An Engineering Perspective on the Usefulness and Usability of Human Engineering Information in Systems
90172	ORAL PRESENTATION	Swierenga, S Boff, K Morton, K		An Engineering Perspective on the Usefulness and Usability of Human Engineering Information in Systems
90179	PROCEEDINGS	Morton, K Swierenga, S J		Developing Effective Coding Schemes for an Advanced Visual Display Technology
90180	ORAL PRESENTATION	Morton, K Swierenga, S J		Developing Effective Coding Schemes for an Advanced Visual Display Technology
90174	ORAL PRESENTATION	Zirkler, D Morton, K		Emergency Checklists: An Application of Hypermedia to a Cockpit Environment
90173	ABSTRACT	Zirkler, D Morton, K		Emergency Checklists: An Application of Hypermedia to a Cockpit Environment
90341	OTHER - POSTER SESSION	Brown, C E Swierenga, S J Wellens, A R		Human-Computer "Friendship": A Metaphor for Intelligent System Design
90255	PROCEEDINGS	Matin, E Boff, K R		Human-Machine Interaction with Serial Visual Display
90256	ORAL PRESENTATION	Matin, E Boff, K R		Human-Machine Interaction with Serial Visual Display
90058	ABSTRACT	Swierenga, S J Morton, K Boff, K R		Issues Concerning the Use of Human Engineering Information: The System Designers' Perspective
90113	PROCEEDINGS	Swierenga, S Morton, K Boff, K		Issues Concerning the Use of Human Engineering Information: The System Designers' Perspective
90114	ORAL PRESENTATION	Swierenga, S Morton, K Boff, K		Issues Concerning the Use of Human Engineering Information: The System Designers' Perspective
90108	ABSTRACT	Morton, K		Military Officers in Human Factors Engineering: Responsibilities, Roles, and Realities
90109	ORAL PRESENTATION	Morton, K		Military Officers in Human Factors Engineering: Responsibilities, Roles, and Realities
90188	ORAL PRESENTATION	Morton, K		Military Officers in Human Factors Engineering: Responsibilities, Roles, and Realities
90014	TECHNICAL REPORT	Kennedy, R S Jones, M B Baltzley, D R	B136770L	Regions of Isoperformance: An Interactive Software Package for Training, Personnel, and

90248	ORAL PRESENTATION	Zirkler, D J Morton, K	The "Paperless" Cockpit: an Application of Mypermedia to Emergency Checklists
90175	ABSTRACT	Swierenga, S J Donovan, R S	The Effect of Rapid Communication Displays on Task Performance
90252	ORAL PRESENTATION	Swierenga, S J Donovan, R S	The Effect of Rapid Communication Displays on Task Performance
90139	PROCEEDINGS	Zirkler, D J Donovan, R S	The Effects of Computer Conferencing on Collaborative System Design: A Language/Action Perspective
90140	ORAL PRESENTATION	Zirkler, D J Donovan, R S	The Effects of Computer Conferencing on Collaborative System Design: A Language/Action Perspective
90060	ABSTRACT	Zirkler, D Morton, K	Using Engineering Models to Compare Paper and Hypermedia-Based Displays of Flight Information
90116	PROCEEDINGS	Zirkler, D Morton, K	Using Engineering Models to Compare Paper and Hypermedia-based Displays of Flight Information
90117	ORAL PRESENTATION	Zirkler, D Morton, K	Using Engineering Models to Compare Paper and Hypermedia-based Displays of Flight Information
***** PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES *****			
***** TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR *****			
***** TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR *****			
***** INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS *****			
***** ADDITIONAL TASK INFORMATION *****			
REQUIREMENTS SUPPORTED: PMD AFSC/SDAE CB Def Equip, PMD R-P2105(7)1/64601F, PMD R-03048(5)/64733F, PMD R-Q 9035(4)/64753, MOA AFAMRL/TAC/XPT, MOA USAF/TFWC/AMD, PJT MAC/XRQ-1, IAA FAA, DoD Directive 3200.12			
CUSTOMERS: ASD/YW, ASD/EN, Army HCL, ARI, NFSC, NOSC, NASA, FAA, AFOSR, NATO AGARD			
MAJOR EQUIPMENT: CASHE Workstation, HyperMedia Laboratory			
FACILITIES: Building 248			

Performance and Workload Assessment

TASK MANAGER: Gary B Reid  
HEG - AV 785-8749

TASK NUMBER: 718414

OBJECTIVES:

1. To develop methodologies, metrics, and standards for the assessment of operators in Air Force systems.
2. To research the characteristics of subjective, behavioral, and physiological measures of workload.
3. To provide measurement tools that are usable in design and evaluation of Air Force systems.
4. To develop a cognitive performance data base.

BACKGROUND:

The current generation of Air Force systems has already dramatically altered the demands that are placed on the human operators. The age that has been predicted for many years where the operator is primarily a systems monitor and decision maker is here. Advancements, using expert systems and advanced display technologies typified by super cockpit research, will have to be evaluated within the context of how they affect the operator's ability to perform this role. Measurement of human performance is imperative in the evaluation of these innovations and in the research of design philosophies that will enhance the symbiosis of human/machine systems.

## TASK TITLE: Performance and Workload Assessment

MIS CATEGORY: Core

MANAGER: Reid OFFICE: HEG PHONE: 58749 START: 01-OCT-76 STOP: 30-SEP-94 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	520,657.00	419,187.00	50,000.00	50,000.00	43,000.00	1,082,844.00
On-Site Contract Costs	463,000.00	414,309.00	573,000.00	568,000.00	697,000.00	2,715,309.00
Civilian Salary Costs	208,542.10	235,666.86	250,860.04	244,296.80	244,222.63	1,183,588.43
Other Support Costs	70,346.71	113,055.40	392.45	431.30	482.63	184,708.49
Internal Funding Subtotal	1,262,545.81	1,182,218.26	874,252.49	862,728.10	984,705.26	5,166,449.92
External Funding						
Off-Site Contract Costs	64,000.00	63,935.00	.00	.00	.00	127,935.00
On-Site Contract Costs	20,000.00	26,065.00	.00	.00	.00	46,065.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	15,998.00	10,000.00	.00	.00	.00	25,998.00
External Funding Subtotal	99,998.00	100,000.00	.00	.00	.00	199,998.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 1,362,543.81	\$ 1,282,218.26	\$ 874,252.49	\$ 862,728.10	\$ 984,705.26	\$ 5,366,447.92
In-House Labor Hours						
Arndt	888	1869	1869	1869	1869	8364
Badeau	502	502	502	1566	1566	4638
Beverly	1710	1710	1710	1710	1710	8550
Fisher	1745	1745	1745	1745	1745	8725
Fracker	1920	1920	1920	1920	1920	9600
Junker	156	156	156	156	156	780
Morton	1330	1330	1330	1330	1330	6650
Reid	1954	1954	1954	1954	1954	9770
Summers	124	124	124	124	124	620
Topmiller	450	450	450	450	450	2250
Tumey	1744	1744	1744	1744	1744	8720
Vidulich	810	810	810	810	1067	4307
Vikmanis	708	917	917	917	917	4376
Wilson	1866	1866	1866	1866	1866	9330
Yates	572	810	1158	572	572	3112
Total Hours (Person-Years)	16479 (7.9)	17301 (8.3)	17649 (8.5)	18127 (8.7)	17812 (8.6)	87368

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT WORKUNIT TITLE  
3005H104 MENTAL WORKLOAD BRAINWAVE ANALYSIS  
3005H204 BRAINWAVE ANALYSIS-II  
71841423 Advanced Performance Assessment of R&D  
71841425 Operator Metric Tech  
71841426 Real-Time Performance Measurement

MONITOR BRANCH PHONE START DATE STOP DATE  
Morton HEG 58865 23-JUL-90 21-FEB-91  
Morton HEG 58865 15-MAY-91 30-SEP-91  
Reid HEG 58749 04-SEP-85 30-SEP-91  
Reid HEG 58749 01-OCT-89 30-SEP-94  
Tumey HEG 58750 01-OCT-86 30-SEP-93

71841427	Perf FB Control System	Junker	58747	01-OCT-87	30-SEP-90
7184142A	UTCPAB NORMATIVE DATABASE	Reid	58749	08-JAN-90	30-SEP-92
7184142B	COMBAT NEURAL NETWORKS	Tumey	58750	19-JAN-90	31-DEC-91
7184142C	SUPPORT FOR PERFORMANCE MEASUREMENT	Reid	58749	08-MAY-90	31-DEC-91
71841430	Laser Fiber Optic Sensor For Human Biomagnetic Measurements	Wilson	58748	27-JUL-87	27-FEB-90
71841431	REAL-TIME MONITORING	Wilson	58748	01-JUL-88	27-JUL-90
71841433	MEG By Lead Field (11)	Badeau	58751	17-NOV-89	17-FEB-92
71841434	Portable Biopotential Recorder	Morton	58865	28-FEB-90	30-APR-91
7184143A	NEUROMAGNETIC METRICS	De Rego	58751	18-FEB-87	31-DEC-92
7184146A	Complex Performance	Reid	58749	01-OCT-86	31-DEC-92
7184146B	Inflight Performance Measures	Yates	57587	01-OCT-86	31-DEC-92
7184146C	AIRCRAFT MISHAP PREVENTION PROGRAM	Yates	57587	03-APR-89	31-DEC-92
7184146D	AMP PROGRAM SYS SPEC DEV	Yates	57587	04-MAY-89	31-DEC-91
7184146E	AMP PROG A/C SPECIFIC SUP	Yates	57587	04-MAY-89	31-DEC-92
7184146F	SOAR STRATEGIC WORKLOAD	Reid	58749	05-MAR-90	31-DEC-92
7184146G	AFOSR MINI-GRANT PROGRAM	Wilson	58748	28-DEC-90	31-DEC-91
7184147A	Advanced NWTB	Yates	57587	17-JUL-86	31-DEC-92
7184147B	Standardization of Performance Test	Wilson	58748	10-NOV-86	31-DEC-92
718414AA	HP1B Equip/CD Stressors	Yates	57587	14-JUL-86	31-DEC-92
718414D3	Freq Domain Feedback EEG	Junker	58747	01-OCT-86	31-DEC-89
718414D7	BAC OF MOTION SIMULATOR	Tumey	58750	04-NOV-88	31-MAR-90
718414D8	Neural Net Proc EEG	Morton	58865	10-JAN-89	10-JAN-90

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005H1--	318.75	----	SUPPORT COSTS	HSD/6106MD
3005H104	49530.00	F41622-90-C-1005	Mental Workload Measurement Using Brainwave Analysis HNC, Inc	HSD/3005
718414--	27.96	----	SUPPORT COSTS	HSD/6106MD
718414--	208542.10	----	SALARY COSTS	HSD/6106MD
71841425	180694.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841425	237556.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841426	17000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841426	27750.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184142A	993.00	----	ARMY MIPR 90MM0501/AAMRLB	ARMY/ARMY
7184142A	993.00	----	ARMY MIPR 90MM0501/AAMRLB	ARMY/ARMY
7184142A	993.00	----	ARMY MIPR 90MM0501/AAMRLB	ARMY/ARMY
7184142A	993.00	----	ARMY MIPR 90MM0501/AAMRLB	ARMY/ARMY

7184142A	993.00	----	ARMY MIPR 90MM0501/AAMRLB	ARMY/ARMY
7184142A	993.00	----	ARMY MIPR 90MM0501/AAMRLB	ARMY/ARMY
7184142A	993.00	----	ARMY MIPR 90MM0501/AAMRLB	ARMY/ARMY
7184142A	993.00	----	ARMY MIPR 90MM0501/AAMRLB	ARMY/ARMY
7184142A	8054.00	----	ARMY MIPR 90MM0501/AAMRLB	ARMY/ARMY
7184142A	10000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ARMY/ARMY
7184142A	10000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ARMY/ARMY
7184142A	64000.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	ARMY/ARMY
71841433	40000.00	F33615-89-C-0577	Magnetoencephalography By Lead Field Synthesis Biomagnetic Technologies, Inc	HSD/3005
71841434	22037.00	F33615-90-C-0530	Development Of A Portable Biopotential Recorder GMS Engineering Corporation	HSD/3005
71841434	22240.00	F33615-90-C-0530	Development Of A Portable Biopotential Recorder GMS Engineering Corporation	HSD/3005
71841434	386850.00	F33615-90-C-0530	Development Of A Portable Biopotential Recorder GMS Engineering Corporation	HSD/3005
7184146A	40000.00	----	AFLC 277 AMR 87-013, 03	HSD/7184
7184146B	30000.00	----	FQ7624-90-00046 MIPR TO D	HSD/7184
FY 90 TOTAL	1,362,543.81	-----		
3005H1--	335.01	----	SUPPORT COSTS	HSD/6106MD
3005H204	250000.00	F41624-91-P-0016	Mental Workload Measurement Using Brainwave Analysis HNC, Inc.	HSD/3005
718414--	29.39	----	SUPPORT COSTS	HSD/6106MD
718414--	230273.17	----	SALARY COSTS	HSD/6106MD
71841423	40000.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/7184
71841425	15145.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841425	300000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184

71841426	37164.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841426	62000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184142A	10000.00	-----	ARMY MIPR 90MM0501, AMEND	ARMY/ARMY
7184142A	26065.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ARMY/ARMY
7184142A	63935.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	ARMY/ARMY
71841433	125000.00	F33615-89-C-0577	Magnetoencephalography By Lead Field Synthesis Biomagnetic Technologies, Inc	HSD/3005
71841434	4187.00	F33615-90-C-0530	Development Of A Portable Biopotential Recorder GMS Engineering Corporation	HSD/3005
7184146A	50000.00	-----	AFLC 277 to DOE/AMR 7-013	HSD/7184
71841468	39855.00	-----	CSERIAC/FQ7624-91-00018/M	HSD/7184
7184146G	22836.00	-----	AF 616 HY 91-19 TO AFOSR	HSD/7184
FY 91 TOTAL	1,276,824.57			
3005H1--	360.80	-----	SUPPORT COSTS	HSD/6106MD
718414--	31.65	-----	SUPPORT COSTS	HSD/6106MD
718414--	237181.36	-----	SALARY COSTS	HSD/6106MD
71841423	50000.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/7184
71841425	508000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841426	65000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
FY 92 TOTAL	860,573.81			
3005H1--	396.52	-----	SUPPORT COSTS	HSD/6106MD
718414--	34.78	-----	SUPPORT COSTS	HSD/6106MD
718414--	244296.80	-----	SALARY COSTS	HSD/6106MD
71841423	50000.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/7184



71841425	505000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841426	63000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
FY 93 TOTAL 862,728.10				
-----				
3005H1--	443.71	----	SUPPORT COSTS	HSD/6106MD
718414--	38.92	----	SUPPORT COSTS	HSD/6106MD
718414--	244222.63	----	SALARY COSTS	HSD/6106MD
71841423	43000.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/7184
71841425	525000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841426	172000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
FY 94 TOTAL 984,705.26				
-----				

5 YEAR TOTAL 5,347,375.55

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90227	A220097	TECHNICAL REPORT	Wilson, G F Ratino, D A Floyd, L L Rodriguez, L E	Brain Stem Evoked Responses in Altered G Environments
90164		ABSTRACT	Wilson, G F Fisher, F E	Classification of Flight Segment Using Pilot and WSO Physiological Data
90331		PROCEEDINGS	Wilson, G F Fisher, F	Classification of Flight Segment Using Pilot and WSO Physiological Data
90062		ABSTRACT	Horst, R L Smith, D T Nebel, J K	Development of a Test-Bed for Real-Time Monitoring of Pilot Mental Status
90300		ABSTRACT	Morton, P E Tumey, D M	Implementation of a Self-Sizing Self-Organizing Artificial Neural Network

Downey, C W  
Schnurer, J H

90250 PROCEEDINGS

Measuring Operator Situation Awareness and Mental Workload

Fracker, M L  
Davis, S A

90301 ABSTRACT

Neural Network Classification of EEG Data Generated Through Use of the Audio Oddball Paradigm

Morton, P E  
Tumey, D M  
Downey, C W  
Schnurer, J H

90063 ABSTRACT

Physiological Measures of Pilot and WSO Workload During Air-to-Ground Missions

Wilson, G F  
Fullenkamp, P  
Davis, I

90158 ABSTRACT

Physiological and Subjective Evaluation of New Aircraft Displays

Wilson, G F  
Hughes, E  
Hassoun, J

90333 PROCEEDINGS

Physiological and Subjective Evaluation of a New Aircraft Display

Wilson, G F  
Hughes, E  
Hassoun, J

90090 TECHNICAL REPORT

Subjective Workload Assessment Technique (SWAT): A User's Guide

Reid, G B  
Potter, S S  
Bressler, J B

90016 TECHNICAL REPORT

The Effects of Stress on Pilot Judgment in a MIDIS Simulator

Wickens, C D  
Stokes, A  
Barnett, B  
Hyman, F

90112 PROCEEDINGS

The Use of Multiple Physiological Measures to Determine Flight Segment in F4 Pilots

Wilson, G F  
Fisher, F

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY

IRAD TOPIC

EVALUATOR

Fockwell International Corp. - North American A/C Hypervelocity Crew Systems

Morton

Johns Hopkins University, Applied Physics Lab

Tumey

McDonnell Douglas Space Systems Company	Real-Time Artificial Intelligence Support Sys in A	Arndt
Logicon Inc. Strategic & Information Systems	Advanced EW Systems Threat ID Techniques	Morton
Grumman Corporation, Bethpage	Controls and Dynamics	Arndt
Grumman Corporation, Bethpage, NY	Artificial Intel/Electro-Optics Integrated Polica.	Arndt
Grumman Corporation, Bethpage, NY	Neural Network Applications	Timey

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED:

CUSTOMERS: AFMIL/EDL, ASD/EN, FAA, NASA Ames, AFFIC, AFOTEC, USA MRDL, NMRI, NAMRI

MAJOR EQUIPMENT: Neuropsychological Workload Test Battery, Criterion Task Set Battery, Brain Mapping System, Flight Data Reduction System, Magnetoencephalograph, PAIS, SIORM

FACILITIES: Bldg 33, 2nd Floor, Rm 225, Rm 226, Rm 227, Rm 229, Rm 228

Visual Technology and Performance

TASK MANAGER: William N Kama  
HEF - AV 785-9247

TASK NUMBER: 718418

OBJECTIVES:

1. To quantify aircraft transparency optical effects.
2. To determine the effect of these optical characteristics upon aircrew visual performance.
3. To develop new and improved measurement techniques for evaluating these optical characteristics.
4. To develop and improve Night Vision Systems technology.

BACKGROUND:

This task supports Program Directive 64212-85-07, Program Management Directive R-P5006(7)64212F/1926, and Technical Need TN-ASD-AFAMRL-USAFSAM -0508-80-61-(2).

TASK TITLE: Visual Technology and Performance

MIS CATEGORY: Core

MANAGER: kama

OFFICE: HEF

PHONE: 59247

START: 01-OCT-76

STOP: 30-SEP-96

PRIMARY PROGRAM ELEMENT: 62502F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	343,064.00	423,426.00	.00	.00	.00	766,490.00
On-Site Contract Costs	394,800.00	418,156.00	.00	.00	.00	812,956.00
Civilian Salary Costs	150,484.80	158,244.74	164,701.73	179,815.77	164,360.02	817,607.06
Other Support Costs	17,351.95	369.90	398.38	437.82	489.93	19,047.98
Internal Funding Subtotal	905,700.75	1,000,196.64	165,100.11	180,253.59	164,849.95	2,416,101.04
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	1,400,000.00	190,000.00	.00	.00	.00	1,590,000.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	1,400,000.00	190,000.00	.00	.00	.00	1,590,000.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 2,305,700.75	\$ 1,190,196.64	\$ 165,100.11	\$ 180,253.59	\$ 164,849.95	\$ 4,006,101.04
In-House Labor Hours						
Barson	682	200				200
Bloek	525	728				682
Bridenbaugh	1176	1176				3437
Craig	1645	1352				5340
Donohue-Perry	1216	1952				7053
Hartman	1730	1740				9024
Kama	795	1334				8690
Merkel	36	200				795
Pinkus	32	400				4238
Purvis	128	128				832
Redwine-Smith	58	200				256
Schueren	504	504				58
Stewart	8527 (4.1)	8580 (4.1)	8444 (4.1)	8897 (4.3)	8283 (4.0)	200
Task						1926
Total Hours (Person-Years)	8527 (4.1)	8580 (4.1)	8444 (4.1)	8897 (4.3)	8283 (4.0)	42731

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT WORKUNIT TITLE

3005H101 MAINTENANCE HUD

3005H103 ENHANCED NVG'S

3005H201 VIRTUAL IMAGE VOLTMETER

3005H203 ENHANCED NVG CONFIGURATION-II

71841802 Optical Measures of Transparency

71841803 Transparency Effects on Visual Performance

MONITOR

Craig

Craig

Craig

kama

kama

BRANCH

HEF

HEF

HEF

HEF

HEF

HEF

PHONE

57592

57592

57592

57592

59247

59247

START DATE

21-MAR-90

07-SEP-89

21-NOV-90

05-NOV-90

01-OCT-76

01-OCT-76

STOP DATE

16-APR-90

03-MAY-90

20-FEB-92

05-MAY-92

30-SEP-96

30-SEP-96



7184187E	35000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ARMY/ARMY
7184187E	50000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ARMY/ARMY
7184187E	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ARMY/ARMY
7184187E	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ARMY/ARMY
7184187E	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ARMY/ARMY
7184187E	500000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ARMY/ARMY
7184187I	101000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/VIC
7184187I	150000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/VIC
7184187J	43064.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/VIC
7184187J	143800.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/VIC
7184187K	17000.00	-----	JP1001 for equipment purc	HSD/HSD
7184187M	100000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ASD/ASD
7184187M	250000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	ASD/ASD

FY 90 TOTAL 2,305,700.75

3005H1--	335.01	-----	SUPPORT COSTS	HSD/6106MD
3005H201	100000.00	F33615-90-C-0535	Virtual Image Voltmeter For Aircraft Maintenance Technicians Silhouette Technology, Incorporated	HSD/3005
3005H203	300000.00	F33615-90-C-0537	Night Vision Goggles Configuration Night Vision Corporation	HSD/3005
718418--	34.89	-----	SUPPORT COSTS	HSD/6106MD
718418--	159620.06	-----	SALARY COSTS	HSD/6106MD
7184180A	20000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	WRDC/WRDC

7184180A	170000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	WL/WL/FIVR
7184187I	116500.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/HMST
7184187I	300000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/CAT
7184187J	23426.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/HMST
7184187N	1656.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/HSD/YA
7184187N	1724.00	-----	JP9118 HSD/YA 91-18 SALAR	HSD/HSD/YA
FY 91 TOTAL	1,193,295.96			

3005H1--	360.80	-----	SUPPORT COSTS	HSD/6106MD
718418--	37.58	-----	SUPPORT COSTS	HSD/6106MD
718418--	160262.41	-----	SALARY COSTS	HSD/6106MD
FY 92 TOTAL	160,660.79			

3005H1--	396.52	-----	SUPPORT COSTS	HSD/6106MD
718418--	41.30	-----	SUPPORT COSTS	HSD/6106MD
718418--	175243.27	-----	SALARY COSTS	HSD/6106MD
FY 93 TOTAL	175,681.09			

3005H1--	443.71	-----	SUPPORT COSTS	HSD/6106MD
718418--	46.22	-----	SUPPORT COSTS	HSD/6106MD
718418--	164360.02	-----	SALARY COSTS	HSD/6106MD
FY 94 TOTAL	164,849.95			

5 YEAR TOTAL 4,000,188.54

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*



\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90344		ABSTRACT	Donohue-Perry, M Riegler, J T	A Compatibility Evaluation of the Protective Integrated Hood Mask With ANVIS Night Vision Goggles
90064		ABSTRACT	Donohue-Perry, M Ramer, D P	A Visual Performance Assessment of ANVIS Compatible Lighting Categories
90295		ORAL PRESENTATION	Donohue-Perry, M Ramer, D P	A Visual Performance Assessment of ANVIS Compatible Lighting Categories
90283		ORAL PRESENTATION	Craig, J L	Air Force Night Vision Goggle R&D Programs
90195		PROCEEDINGS	Craig, J L Purvis, B D	B-52 Night Vision Goggle Head-Up Display Development
90196		ORAL PRESENTATION	Craig, J L Purvis, B D	B-52 Night Vision Goggle Head-Up Display Development
90218		PROCEEDINGS	Task, H L Hartman, R T Zobel, A R	New Methods for Nigh Vision Goggle Test and Evaluation
90141		ABSTRACT	Task, H L Hartman, R T Zobel, A D	New Methods for Night Vision Goggle Test and Evaluation (U)
90286		ORAL PRESENTATION	Whiteley, J D Riegler, J T	The Effect of NVG Image Intensifier Tube Signal-to-Noise Ratio on Visual Acuity

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
ITT Electro-Optical Products Division	Advanced Image Intensifier Tube Developmt:Gen III	Hartman
ITT Electro-Optical Products Division	Advanced Image Intensifier Night Vision Sys.Develpt	Hartman
ITT Electro-Optical Products Division	Automated Measurements	Hartman
ITT Electro-Optical Products Division	Thin Film Phosphor Materials & Deposition Process	Hartman

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: TN ASD/AMRL/AFFDL 060207056(1), PMD R-P 5006(12) 64212/F1926 SAF/AQP, TAC ROC 26-71, TAC ROC 310-73, TAC ROC 303-76, CSAF/RD MSG 0221542 FEB 76, ASD/YP LTR 9 MAR 78

CUSTOMERS: AFWAL/FIER

MAJOR EQUIPMENT: Windscreen Measurement Table, B-52 Simulator, ZOOM Lane, Spectral Scanning Facility, NVG-Compatible Lighting Cockpit

FACILITIES: Bldg 248 and Bldg 33

Integration Criteria for Advanced Technology Aircraft

TASK MANAGER: Robert G Eggleston  
HEA - AV 785-8855

TASK NUMBER: 718419

OBJECTIVES

1. To develop and evaluate man-machine integration concepts and criteria for advanced technology aircraft.
2. To apply these criteria to the design of advanced crew-vehicle interfaces to ensure an effective sensory, perceptual, and cognitive compatibility between the crew and the weapon system.

BACKGROUND:

Special attention is given to the criteria needed to adequately assess crew-related technologies associated with systems that incorporate significant machine intelligence features.

## TASK TITLE: Integration Criteria for Advanced Technology Aircraft

MIS CATEGORY: Thrust

MANAGER: Eggleston OFFICE: HEA PHONE: 58855 START: 01-OCT-76 STOP: 30-SEP-94 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	67,000.00	.00	123,000.00	.00	.00	190,000.00
On-Site Contract Costs	55,000.00	94,000.00	.00	120,000.00	242,000.00	511,000.00
Civilian Salary Costs	65,173.40	77,765.85	101,529.19	104,575.07	90,517.15	439,560.66
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	187,173.40	171,765.85	224,529.19	224,575.07	332,517.15	1,140,560.66
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 187,173.40	\$ 171,765.85	\$ 224,529.19	\$ 224,575.07	\$ 332,517.15	\$ 1,140,560.66
In-House Labor Hours						
Eggleston	1904	1697	1905	1905	1905	9316
Forester	92					92
Longinow	725	725	725	725		2900
Straub	832	832	1560	1560	1560	5512
Warren	36					36
Total Hours (Person-Years)	2757 (1.3)	3254 (1.6)	4190 (2.0)	4190 (2.0)	3465 (1.7)	17856

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
71841901	Weapon Delivery Interfaces For Advanced Fighter Aircraft	Eggleston	HEA	58855	01-OCT-76	30-SEP-93
71841908	INTEGRATION CRITERIA FOR ATA-EXP	Stevenson	HEA	57582	28-MAR-89	30-SEP-90
71841909	COGNITIVE ENGRG: VMCI	Eggleston	HEA	58855	14-FEB-84	30-SEP-94
71841918	COG Complexity Metric Development	Eggleston	HEA	58855	01-OCT-88	31-DEC-92
7184191C	COG Complexity Modeling	Eggleston	HEA	58855	06-JUN-88	31-DEC-92
7184199A	Interface Design Lang Specification	Eggleston	HEA	58855	01-OCT-88	31-DEC-92

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
718419--	65173.40	----	SALARY COSTS	HSD/6106MD

71841909	55000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71841918	67000.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	HSD/7184
FY 90 TOTAL	187,173.40			
718419--	77765.85	-----	SALARY COSTS	HSD/6106MD
71841909	94000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
FY 91 TOTAL	171,765.85			
718419--	101529.19	-----	SALARY COSTS	HSD/6106MD
71841909	123000.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	HSD/7184
FY 92 TOTAL	224,529.19			
718419--	104575.07	-----	SALARY COSTS	HSD/6106MD
71841909	120000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
FY 93 TOTAL	224,575.07			
718419--	90517.15	-----	SALARY COSTS	HSD/6106MD
71841909	242000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
FY 94 TOTAL	332,517.15			
5 YEAR TOTAL	1,140,560.66			
***** ENHANCEMENTS *****				
***** PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR *****				

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
GTE Government Systems Corp.	Artificial Intelligence (Knowledge-Based) Systems	Longinow
GTE Laboratories, Waltham MA	Distributed AI and Cooperative Problem Solving	Longinow
GTE Laboratories	Knowledge Representation for Network Applications	Longinow
GTE Laboratories	Learning in Expert Domains	Longinow
GTE Laboratories	Advanced Communication Architectures & Technology	Longinow
Hughes Danbury Optical Systems, Inc.	Artificial Intelligence Research	Longinow
General Dynamics, Fort Worth Division	Artificial Intelligence Applications for Suprtblty	Longinow
General Dynamics, Fort Worth Division	Threat Assessment Expert Systems	Longinow
Lockheed Aeronautical Systems Company	Artificial Intelligence in Computer Aided Engrg.	Longinow
Lockheed Aeronautical Systems Company	Intelligent Crew Systems and Decision Aids	Eggleston
United Technologies Corp., Silorsky Aircraft Div.	Advanced Cockpit Technology	Eggleston
McDonnell Douglas Training Systems	Intelligent Training & Maintenance Informa. System	Eggleston
Honeywell, Inc., Systems and Research Center	Cognitive Decision Aiding Systems	Eggleston
Westinghouse Electric Corp., Electronic Sys Group	Artificial Intelligence (AI) Techniques	Longinow
Westinghouse Electric Corp., Science & Tech Ctr	Decision Sciences	Longinow

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: SAC SON 06-79, SAC SON 05-80, TAF SON 307-81, TAF SON 302-81, TAF GOR 304-78, SAC SON 12-81, SAC SON 11-81, SAC SON 10-81

CUSTOMERS: AFWAL/AAR, ASD/YW, ARMY HEL, ASD/SD/B-1B, ASD/RW

MAJOR EQUIPMENT: VCASS

FACILITIES: Bldg 248 (VCASS Laboratory, Rooms 305-306)

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TASK: 718419

Tactical Aircraft Cockpit Development and Evaluation Program (tacdep)

TASK MANAGER: Michael W Haas  
HEA - AV 785-8893

TASK NUMBER: 718426

OBJECTIVES:

1. To develop a sound theoretical and empirical basis for matching the perceptual and psychomotor characteristics of a pilot to the layout, displays, controls, and portrayal of information within a crew station.
2. To develop and demonstrate advanced control and display concepts that take advantage of human perceptual and psychomotor capabilities to improve overall system performance.



TASK TITLE: Tactical Aircraft Cockpit Development and Evaluation Program (tacdep)

MIS CATEGORY: Thrust

MANAGER: Haas

OFFICE: HEA

PHONE: 58893

START: 01-OCT-80

STOP: 30-SEP-95

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED		FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding							
Off-Site Contract Costs		904,475.00	681,287.00	618,000.00	290,000.00	290,000.00	2,783,762.00
On-Site Contract Costs		675,800.00	1,091,532.00	728,000.00	968,000.00	1,062,000.00	4,525,332.00
Civilian Salary Costs		243,332.10	237,309.15	250,345.25	217,740.58	224,764.32	1,173,491.40
Other Support Costs		15,000.00	.00	.00	.00	.00	15,000.00
Internal Funding Subtotal		1,838,607.10	2,010,128.15	1,596,345.25	1,475,740.58	1,576,764.32	8,497,585.40
External Funding							
Off-Site Contract Costs		256,000.00	90,000.00	.00	.00	.00	346,000.00
On-Site Contract Costs		.00	.00	.00	.00	.00	.00
Civilian Salary Costs		.00	961.93	.00	.00	.00	961.93
Other Support Costs		961.93	.00	.00	.00	.00	961.93
External Funding Subtotal		256,961.93	90,961.93	.00	.00	.00	347,923.86
Unfunded Requirements	(	.00)	.00)	.00)	.00)	.00)	.00)
Total Annual Costs	\$	2,095,569.03	\$ 2,101,090.08	\$ 1,596,345.25	\$ 1,475,740.58	\$ 1,576,764.32	\$ 8,845,509.26
In-House Labor Hours							
Beard	(MILITARY)	213	42	42	42		339
Boff		479	478	478			1435
Calhoun		1823	1823	1823	1823	1823	9115
Campbell	(MILITARY)	552	552	552	552		2208
Ellifritt		290	289	289			868
Goins	(MILITARY)	116					116
Green		8					8
Haas		1714	1646	1854	1854	1854	8922
Hann		526	526	526			1578
Kocian		45	45	45	45		180
Longinow		1175	1175	1175	1175	1900	6600
Martin		292	292	292	292		1168
Monk		132	132	132			396
Ortiz	(MILITARY)	902	902	902	902	1839	3608
Osgood		1838	1839	1839	1839	1839	9194
Russell		439	1803	1803	1803		5409
Russell	(MILITARY)	124					439
Schueren	(MILITARY)	186	186	186	186	922	1666
Self		675	83	83	83	62	986
Straub		119	181	181	62		543
Summers		137	42	42	42		263
Tsou		1754					1754
Valencia	(MILITARY)	1692					1692
Venturino		1752					1752
Williams	(MILITARY)		1579				3331
Total Hours (Person-Years)		16983 (8.2)	13615 (6.5)	12244 (5.9)	10700 (5.1)	8400 (4.0)	61942

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
71842601	Adv TAC Crew Station Intq	Haas	HEA	58893	01-OCT-80	30-SEP-93
71842602	TAC Cont/Display Eval/Mod	Venturino	HEA	58895	01-OCT-80	30-SEP-95
71842607	Automated Human Factors Data Base Management for Designers	Monk	HEX	58814	01-MAR-85	14-SEP-92
71842611	Pilot-Centric TASS Program	Calhoun	HEA	57595	06-OCT-87	06-JAN-92
71842616	SITUATION AWARENESS METRI	Venturino	HEA	58895	01-JUL-88	11-SEP-90
71842617	SITUATION AWARENESS II	Osgood	HEA	54033	07-NOV-90	07-NOV-92
71842618	NYIT GRAPHICS	Haas	HEA	58893	01-OCT-88	31-DEC-94
7184261C	VPD SOFTWARE	Haas	HEA	58893	01-OCT-88	30-SEP-91
7184261E	Support for VCS Development	Haas	HEA	58893	26-AUG-86	31-DEC-92
7184261F	Computer Graphics For OCS	Haas	HEA	58893	10-APR-87	30-SEP-91
7184261G	CIMMS	Haas	HEA	58893	01-OCT-87	30-SEP-90
7184261H	DADS for IDINS	Haas	HEA	58893	10-APR-88	31-DEC-92
7184261J	Agile Cockpit Integration	Haas	HEA	58893	16-MAY-88	30-SEP-91
7184261K	GRANT AFOSR-87-0231	Haas	HEA	58893	14-OCT-88	30-SEP-91
7184261L	LOCALIZER SOFTWARE DEVELOPMENT	Haas	HEA	58893	03-OCT-89	30-SEP-90
7184261M	NIGHT FOV STUDY	Haas	HEA	58893	02-JAN-90	30-SEP-92
7184261N	ELECTRONIC SPOT SCANNER	Haas	HEA	58893	02-JAN-90	30-SEP-91
7184261P	HEAD POSITION PREDICTION	Venturino	HEA	58895	30-OCT-90	30-SEP-92
7184262E	Technical Data Base	Osgood	HEA	54033	03-OCT-89	31-DEC-92
7184262F	SA METRICS SPECIFICATION	Osgood	HEA	54033	03-OCT-89	31-DEC-92
7184262G	ADV VIRTUAL DSP FORMATS	Osgood	HEA	54033	03-OCT-89	31-DEC-92
7184262H	TACTICAL DATA BASE	Calhoun	HEA	57595	04-DEC-89	30-SEP-91
7184262I	SBIR PHASE I DATA BASE	Boff	HEX	57596	13-MAR-90	31-DEC-91
7184262J	PERCEPTUAL PERF PROTOTYPE	Calhoun	HEA	57595	11-APR-90	31-DEC-91
7184262K	LIGHT HELICOPTER PROGRAM	Monk	HEX	58814	04-MAY-90	30-SEP-91
7184262L	DEVELOPMENT OF P3	Monk	HEX	58814	01-JUL-90	31-DEC-90
7184262M	SUPPORT OF FEDERAL AVIATION AGENCY	Calhoun	HEA	57595	01-OCT-84	31-MAR-90
718426D1	Eye Resp to Cue Modality	Calhoun	HEA	57595	01-OCT-87	30-SEP-91
718426D4	Methods of Pupill Sensing	Haas	HEA	58893	08-AUG-88	31-DEC-92
718426V1	AGILE CUE HMD	Haas	HEA	58893	23-MAY-89	31-DEC-92
718426V2	AIR-SURFACE F-C-V STUDY	Haas	HEA	58893		

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
718426--	243332.10	----	SALARY COSTS	HSD/6106MD
71842601	190714.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71842601	230550.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71842601	237556.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71842607	50000.00	F33615-86-C-0542	Automated Human Factors Data Base Management for Designers Search Technology, Inc.	HSD/7184
71842607	105000.00	F33615-86-C-0542	Automated Human Factors Data Base Management for Designers Search Technology, Inc.	HSD/7184

71842611	69000.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	HSD/7184
71842611	70000.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	HSD/7184
71842617	100000.00	F33615-90-C-0536	Situation Awareness Metric For Cockpit Configuration Evaluation Charles River Analytics, Inc.	HSD/3005
7184261A	43000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/7184
7184261A	93800.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/7184
7184261B	31597.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/7184
7184261F	1516.00	-----	HY-90-005/F33601-90-PH-61	HSD/7184
7184261F	1784.00	-----	HY-90-005	HSD/7184
7184261F	11700.00	-----	HSD HY-90-005/F3360190PG0	HSD/7184
7184261L	1700.00	F33615-85-C-0530	Biodynamic Engineering Support Systems Research Laboratories, Inc.	HSD/7184
7184261L	15300.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7184
7184261M	123778.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/VIC
7184261M	200000.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/7184
7184262F	18300.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/7184
7184262J	60000.00	F33615-86-C-0542	Automated Human Factors Data Base Management for Designers Search Technology, Inc.	AFOSR/AFOSR
7184262K	156000.00	F33615-87-C-0534	Pilot-Centric TASS Program MacAulay-Brown, Inc.	ARMY/ARMY
7184262L	5000.00	F33615-86-C-0542	Automated Human Factors Data Base Management for Designers Search Technology, Inc.	ARMY/ARMY
7184262L	5000.00	F33615-86-C-0542	Automated Human Factors Data Base Management for Designers Search Technology, Inc.	ARMY/ARMY
7184262L	30000.00	F33615-86-C-0542	Automated Human Factors Data Base Management for Designers Search Technology, Inc.	ARMY/ARMY
7184262M	961.93	-----	JM9573 CK# 3084-24509573	FAA/FAA
FY 90 TOTAL	2,095,569.03			

				SALARY COSTS		
718426--	230666.36	-----				HSD/6106MD
71842601	100000.00	F33615-89-C-0532		Engineering Support LOGICON, Inc		HSD/7184
71842601	330000.00	F33615-89-C-0532		Engineering Support LOGICON, Inc		HSD/7184
71842602	37000.00	F33615-89-C-0532		Engineering Support LOGICON, Inc		HSD/7184
71842602	291532.00	F33615-89-C-0532		Engineering Support LOGICON, Inc		HSD/7184
71842602	340000.00	F33615-89-C-0532		Engineering Support LOGICON, Inc		HSD/7184
71842607	48105.00	F33615-86-C-0542		Automated Human Factors Data Base Management for Designers Search Technology, Inc.		HSD/7184
71842607	86000.00	F33615-86-C-0542		Automated Human Factors Data Base Management for Designers Search Technology, Inc.		HSD/7184
71842607	222000.00	F33615-86-C-0542		Automated Human Factors Data Base Management for Designers Search Technology, Inc.		HSD/7184
71842611	35000.00	F33615-87-C-0534		Pilot-Centric TASS Program MacAulay-Brown, Inc.		HSD/7184
71842617	47394.00	F33615-90-C-0536		Situation Awareness Metric For Cockpit Configuration Evaluation Charles River Analytics, Inc.		HSD/3005
71842614	30000.00	F33615-87-C-0531		System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp		HSD/7184
71842618	505.00	F33615-88-D-0532		High Level Academic Support Southeastern Ctr for Elec Engr Ed.		HSD/7184
71842618	5625.00	F33615-88-D-0532		High Level Academic Support Southeastern Ctr for Elec Engr Ed.		HSD/7184
71842618	64938.00	F33615-88-D-0532		High Level Academic Support Southeastern Ctr for Elec Engr Ed.		HSD/7184
71842628	1720.00	F33615-88-D-0532		High Level Academic Support Southeastern Ctr for Elec Engr Ed.		HSD/7184
71842624	90000.00	F33615-87-C-0534		Pilot-Centric TASS Program MacAulay-Brown, Inc.		ARMY/ARMY
7184262M	961.93	-----		SALARY REIMBURSEMENT/JM95		FAA/FAA
FY 91 TOTAL	2,101,447.29	-----				
718426--	243503.18	-----		SALARY COSTS		HSD/6106MD

71842601	240000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71842602	488000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71842607	71000.00	F33615-86-C-0542	Automated Human Factors Data Base Management for Designers Search Technology, Inc.	HSD/7184
7184261A	290000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/7184
7184261B	257000.00	F33615-88-D-0532	High Level Academic Support Southeastern Ctr for Elec Engr Ed.	HSD/7184

FY 92 TOTAL 1,589,503.18

718426--	210693.25	-----	SALARY COSTS	HSD/6106MD
71842601	718000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71842602	250000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184261A	290000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/7184

FY 93 TOTAL 1,468,693.25

718426--	220539.31	-----	SALARY COSTS	HSD/6106MD
71842601	718000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
71842602	344000.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/7184
7184261A	290000.00	F33615-87-C-0531	System Engineering Design and Technical Analysis For SACDEF Science Applications International Corp	HSD/7184

FY 94 TOTAL 1,572,539.31

5 YEAR TOTAL 8,827,752.06

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90073		ABSTRACT	Valencia, G Ericson, M Agnew, J R	A Comparison of Localization Performance with Two Auditory Cue Synthesizers
90106		PROCEEDINGS	Valencia, G Ericson, M Agnew, J	A Comparison of Localization Performance with Two Auditory Cue Synthesizers
90107		ORAL PRESENTATION	Valencia, G Ericson, M Agnew, J	A Comparison of Localization Performance with Two Auditory Cue Synthesizers
90235		INPUT TO INTERIM REPORT	Haas, M W	Advanced Air Force Mission Planning System Description
90338		ABSTRACT	Osgood, R K	Altitude Maintenance Using an Off-Boresight Helmet-Mounted Virtual Display
90226		ABSTRACT	Agnew, J R	Auditory Spatial Discrimination with Simulated 3-D
90268		ORAL PRESENTATION	Agnew, J R	Auditory Spatial Discrimination with Simulated 3-D Sound
90160		ABSTRACT	Valencia, G Agnew	Evaluation of a Directional Audio Display Synthesizer
90290		PROCEEDINGS	Valencia, G Agnew, J R	Evaluation of a directional Audio Display Synthesizer
90291		ORAL PRESENTATION	Valencia, G Agnew, J R	Evaluation of a directional Audio Display Synthesizer
90185		ABSTRACT	Calhoun, G L	Eye and Head Response as Indicators of Attention Cue Effectiveness
90292		PROCEEDINGS	Calhoun, G L Janson, W P	Eye and Head Response as Indicators of Attention Cue Effectiveness
90293		ORAL PRESENTATION	Calhoun, G L Janson, W P	Eye and Head Response as Indicators of Attention Cue Effectiveness
90238		PROCEEDINGS	Maxwells, J W Haas, M W	Head Movement During Air-to-Air Engagements
90314		PROCEEDINGS	Venturino, M R Wells, M J	Head Movements as a Function of Field-of-View Size on Helmet-Mounted Display
90315		ORAL PRESENTATION	Venturino, M R Wells, M J	Head Movements as a Function of Field-of-View Size on Helmet-Mounted Display
90006	B133510	TECHNICAL REPORT	Valencia, G Calhoun, G L	Headphone Localization with a Single Sound Transducer and Moveable Manikin Head
90270		OTHER - INTERIM REPORT	Haas, M W	III Assessment Methodology
90210		PROCEEDINGS	Osgood, R K Venturino, M R	Information Representations for Aircraft Attitude Displays

90211	ORAL PRESENTATION	Osgood, R K Venturino, M R	Information Representations for Aircraft Attitude Displays
90312	PROCEEDINGS	Osgood, R K Venturino, M R	Information Representations for Aircraft Attitude Displays
90313	ORAL PRESENTATION	Osgood, R K Venturino, M R	Information Representations for Aircraft Attitude Displays
90269	OTHER - BOOK, CHAPTER	Rouse, W B Cody, W J Boff, K R Frey, P R	Information Systems for Supporting Design of Complex Human-Machine Systems
90034	OTHER - INTERIM REPORT	Haas, M W	NATO Multi-Level Mission Planning Requirements
90247	ORAL PRESENTATION	Geiselman, E E Wolpert, L Venturino, M R	Optical Flow Sensitivity: Effects of Field-of-View and View of Optical Field
90262	PROCEEDINGS	Wells, M J Venturino, M	The Effects of Field-of-View Size on Head Movements in a Helmet-Mounted Simulator
90263	ORAL PRESENTATION	Wells, M J Venturino, M	The Effects of Field-of-View Size on Head Movements in a Helmet-Mounted Simulator
90176	ABSTRACT	Boff, K R Monk, D L Zirkler, D J Swierenga, S J	Understanding the Human Factors of Design: Findings and Their Implications for Aiding System Design
90336	ABSTRACT	Osgood, R K Wells, M J	Visual Field-of-View Requirements for Night Air-to-Ground Missions

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

#### CUSTOMERS

ASD/YP

Night Sensor Field-of-View Study

57FWW/DTB

Operationally-Based Measures of Merit for Situational Awareness

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY

IRAD TOPIC

EVALUATOR

CAE-Link Corp, Link Flight Simulation Div	Digital Image Generator Building Block Study	Haas
Hughes Simulation Systems, Inc.	Micropoly II	Tsou
Hughes Simulation Systems, Inc.	Simulated Electronic Flight-Instrumentation System	Tsou
Hughes Simulation Systems, Inc.	Database Tools	Tsou
Hughes Simulation Systems, Inc.	Multiple Microprocessor System Architecture	Tsou
Hughes Simulation Systems, Inc.	Trainer Software and Tools Improvement	Tsou
Hughes Simulation Systems, Inc.	Advanced Trainer Architecture	Tsou
Hughes Simulation Systems, Inc.	Visual and Sensor Systems	Tsou
Hughes Simulation Systems, Inc.	Simulator Technology - Crew Station Testbed	Tsou
Hughes Simulation Systems, Inc.	Performance Measurement in Tactical Team Training	Tsou
McDonnell Aircraft Company	Advanced Crew Station Concepts	Haas
McDonnell Aircraft Company	Advanced Crew Station Design Concepts	Haas
McDonnell Aircraft Company	Man-Machine Interface & Performance Prediction	Haas
McDonnell Aircraft Company	Interactive Digital Simulation	Haas
Martin Marietta Corp.Electronics & Missiles Group	Advanced Mission Avionics Study	Self
Hughes Danbury Optical Systems, Inc.	Optical Computer Research	Haas
Hughes Aircraft Company Ground Systems Group	Advanced Display Systems	Haas
Hughes Aircraft Company, Radar Systems Group	Holographic Technology Applications	Self
Northrop Corporation, Avionics Division	Situation Awareness Enhancement Techniques	Venturino
Northrop Corporation, Aircraft Division	Advanced Cockpit Implementation and Integration	Osgood
General Dynamics, Fort Worth Division	Visually Coupled Systems Integration	Osgood
General Dynamics, Fort Worth Division	Advanced Cockpits Crew Accommodation	Osgood
General Dynamics, Fort Worth Division	Advanced Cockpits Information and Control Managemt	Venturino
General Dynamics, Fort Worth Division	Cockpit Configuration Development	Osgood
McDonnell Douglas Training Systems, St. Louis	Reconfigurable Cockpit Technology Development	Haas
Honeywell, Inc., Systems Research Center	Advanced Graphics Generator Technology	Haas
Boeing Computer Services	Smart Avionics	Haas
Boeing Computer Services	Human Computer Interaction	Osgood
Boeing Aerospace & Electronics	Advanced Workstation Technology	Haas



Westinghouse Electric Corp., Electronic Sys Group	Information Presentation Technology	Haas
Westinghouse Electric Corp., Electronic Sys Group	Command and Control Studies	Haas
Westinghouse Electric Corp., Electronic Sys Group	Advanced Multi-Sensor Systems	Haas
Westinghouse Electric Corp., Science & Tech Ctr	Artificial Intelligence	Haas

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: MOA AAMRL ASD/YW, TAF SON 307-81, TAF SON 302-81, TAF GOR 304-78

CUSTOMERS:	ASD/YW,	ARMY	HEL,	ASD/SD/B-1B,	ASD/RW,	NASA/HQ,	NASA/JSC,	NASA/Ames,	NTSC,	NADC,
	USAFSAM/VNB, AFHRL/OIE, HSD/YA, WRDC/KT, AATC									

MAJOR EQUIPMENT: Helmet-Mounted Oculometer System, Visually Coupled System Simulator, CIMMS

FACILITIES: Building 248

C3 Operator Performance Engineering (COPE)

TASK MANAGER: Donald L Monk  
                  HEX - AV 785-8814

TASK NUMBER: 718427

OBJECTIVES:

1. To produce a set of techniques which will allow effective description and analysis of Command, Control, and Communication (C3) systems, emphasizing the role of the human component.
2. To establish a body of empirical data describing human performance in C3 systems.
3. To develop guidelines, based on experimental evidence, for the design of C3 workstations and command centers.

BACKGROUND:

COPE is a 6.2 research program designed to investigate the performance of human operators as information processors and decision makers and to apply that knowledge to the design and modification of USAF C3 systems so that the resulting total system performance will be improved. To accomplish its mission, the COPE task uses a variety of laboratory experimentation, modeling and analysis techniques, and equipment prototyping. All three of these elements are enhanced by field support. Field support provides the vehicle to transition COPE technology into use and to guide the evolution of the COPE task so it stays responsive to command and control issues facing C3 users.

TASK TITLE: C3 Operator Performance Engineering (COPE)

MIS CATEGORY: Thrust

MANAGER: Monk

OFFICE: HEX

PHONE: 58814

START: 04-AUG-81

STOP: 30-JAN-93

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal funding						
Off-Site Contract Costs	103,033.00	160,133.00	.00	.00	.00	263,166.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	7,841.80	.00	.00	.00	.00	7,841.80
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal funding Subtotal	110,874.80	160,133.00	.00	.00	.00	271,007.80
External funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 110,874.80	\$ 160,133.00	\$ .00	\$ .00	\$ .00	\$ 271,007.80
In-House Labor Hours						
Lambert (MILITARY)	138					138
McFarren (MILITARY)	52					52
Skelly	365					365
Total Hours (Person-Years)	555 (.3)	(.0)	(.0)	(.0)	(.0)	555

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
71842701	Integrated Analysis Techniques	McFarren	HED	58822	04-AUG-81	30-SEP-92
71842703	C3 Station Concepts	Monk	HEX	58814	04-AUG-81	31-DEC-90
71842710	NEXT GENERATION HUMAN FACTORS ENGINEERING	Lambert	HED	58857	30-JAN-91	30-JAN-93
71842712	MAN MACHINE INTERFACES KNOWLEDGE ARCHITECTURE	Lambert	HED	58857	30-JAN-91	03-JAN-93
71842717	Travel for Granite Sentry	Redwine Smith	HEX	58853	01-OCT-87	30-SEP-90
7184271A	Support for 71842707	Forester	HEF	57576	23-JUL-86	31-DEC-89
718427D4	Temporal Patterning Sensitivity	Skelly	HED	58823	01-OCT-86	31-DEC-89

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
718427--	7841.80	----	SALARY COSTS	HSD/6106MD

71842712 103033.00 F33615-90-C-0533 Cognitive Engineering of Adv Info Tech for AF Sys Design Dev/Eval HSD/3005  
KLEIN ASSOCIATES, INC.

FY 90 TOTAL 110,874.80

71842712 160133.00 F33615-90-C-0533 Cognitive Engineering of Adv Info Tech for AF Sys Design Dev/Eval HSD/3005  
KLEIN ASSOCIATES, INC.

FY 91 TOTAL 160,133.00

5 YEAR TOTAL 271,007.80

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90245		DRAFT TR	Wellens, A R	Assessing Multi-Person and Person-Machine Distributed Decision Making Using an Extended Psychological
90202	A218558	TECHNICAL REPORT	Andriole, S J Adelman, L	Cognitive Engineering of Advanced Information Technology for Air Force Systems Design and Development
90322	A225582	TECHNICAL REPORT	Kapasouris, P Serfaty, D Wohl, J G Deckert, J C	Mapping Missions Onto C3 Organizations: Incorporating the Goal Dimension in IAT
90015	A209618	TECHNICAL REPORT	McBride, D J Brown, C E	Team Performance in Dynamic Decision Making: The Importance of Heuristics
90089	A214280	TECHNICAL REPORT	Tolcott, M A Lehner, P E Mullen, T M	User Interaction with Self-Learning System

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: SAC GOR 205-78, HQ USAF SON 4-81, RADC PROJ 5581, AFSPACECOM SONS 03-84, 10-85 and 12-85, MAC SON 3-81, SAC SON 14-86, Forecast II PS-48, PT-40, PT-36

CUSTOMERS: ESD/XR/TOET, RADC/CO, HQ TAC TAFIG, AFHRL/LRG, ASD/ENTECH, SD/DET 2, ESD/SCC, DCA/CCIP, NMIC, SPACECOM/XPWC, ESC/XPZA, NORAD

MAJOR EQUIPMENT: PDP 11/34 Computer, Shielded Experimental Facility, C3 Prototype Work Station, PDP 11/60 Computer, Xerox 1108 Lisp-Based Workstation, IRIS Computer Graphics System

FACILITIES: Building 248

Engineering Support Services - Biodynamics and Bioengineering Division

TASK MANAGER: William L Weide  
BB - AV 785-3603

TASK NUMBER: 723100

OBJECTIVES:

This task provides general engineering support services to operate and maintain facilities and equipment and to assist in-house scientific researchers in the performance of all tasks assigned to the Biodynamics and Bioengineering Division. The only resources identified in the task summary sheets for this task are the resources used to manage the contracts assigned to this task or to provide general purpose support functions for Project 7231 that cannot be identified with any specific task. Products supported by the resources shown here will be listed in the summary sheets of the individual tasks with which those products are identified, even when substantial support for those products may have been provided by engineering support contracts assigned to this task.

TASK TITLE: Engineering Support Services - Biodynamics and Bioengineering Division

MIS CATEGORY: Core

MANAGER: Welde

OFFICE: BB

PHONE: 53603

START: 24-FEB-81

STOP: 16-JAN-95

PRIMARY PROGRAM ELEMENT: '2202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	588,778.35	583,376.00	.00	.00	.00	1,172,154.35
Civilian Salary Costs	21,649.40	18,805.46	19,369.62	19,950.71	20,549.23	100,324.42
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	610,427.75	602,181.46	19,369.62	19,950.71	20,549.23	1,272,478.77
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	331,572.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	331,572.00	.00	.00	.00	.00	331,572.00
Unfunded Requirements	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Total Annual Costs	\$ 941,999.75	\$ 602,181.46	\$ 19,369.62	\$ 19,950.71	\$ 20,549.23	\$ 1,604,050.77
In-House Labor Hours						
Scarborough (MILITARY)	509					509
Welde	757	624	524	624	624	3253
Total Hours (Person-Years)	1266 (.6)	624 (.3)	624 (.3)	624 (.3)	624 (.3)	3762

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE
72310002	Biodynamic Engineering Support
72310003	BIODYNAMIC ENGR SUPPORT

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
723100--	21649.40	----	SALARY COSTS	HSD/6106MD
72310002	53102.51	F33615-85-C-0530	Biodynamic Engineering Support Systems Research Laboratories, Inc.	HSD/7231
72310003	.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/NSBIT

72310003	147.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/VIC
72310003	3148.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/6106MD
72310003	4750.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/SAM
72310003	7158.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/VIC
72310003	10000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72310003	10558.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/SAM
72310003	12400.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFSC/AFOSR
72310003	12548.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/VIC
72310003	16000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HSD
72310003	17848.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFSC/AFESC
72310003	18000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/YAH/CREST
72310003	20000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/CREST
72310003	20250.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HSD
72310003	31455.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/CREST
72310003	33361.84	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72310003	42500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	ASD/ASD
72310003	60000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	IAC/IAC
72310003	82500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFOSR/AFOSR
72310003	98324.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	NAVY/NAVY



7231003	180000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/CREST
7231003	186300.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/VIC
FY 90 TOTAL	941,999.75			
723100--	18805.46	----	SALARY COSTS	HSD/6106MD
7231003	38500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/CREST
7231003	159871.00	F33615-89-C-0532	Engineering Support LOGICON, Inc	HSD/CREST
7231003	385005.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/CREST
FY 91 TOTAL	602,181.46			
723100--	19369.62	----	SALARY COSTS	HSD/6106MD
FY 92 TOTAL	19,369.62			
723100--	19950.71	----	SALARY COSTS	HSD/6106MD
FY 93 TOTAL	19,950.71			
723100--	20549.23	----	SALARY COSTS	HSD/6106MD
FY 94 TOTAL	20,549.23			
5 YEAR TOTAL	1,604,053.77			

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: In-house task support

CUSTOMERS: All branches of the Biodynamics and Bioengineering Division

MAJOR EQUIPMENT:

FACILITIES: Building 441, Building 824, Building 33

NOTE: This task summary covers only administrative and support costs for an Operations and Maintenance contract that supports the entire project. Specific funding and products are listed under the individual workunits that supply funding to the contract.

Biodynamics and Bioengineering Support

TASK MANAGER: William L. Welde  
BB - AV 785-3603

TASK NUMBER: 723120

OBJECTIVES:

To provide expert consultation and support to requesting agencies requiring technical advice, experimental evaluations, or performance criteria related to biodynamics and bioengineering technology.

# AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK TITLE: Biodynamics and Bioengineering Support

MANAGER: Weide

OFFICE: BB PHONE: 53603

START: 30-SEP-76 STOP: 31-DEC-95

TASK NUMBER: 723120  
MIS CATEGORY: Support  
PRIMARY PROGRAM ELEMENT: 62202F

## SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED		FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		157,112.77	172,010.69	302,576.00	337,921.00	.00	969,620.46
Civilian Salary Costs		223,429.32	229,305.27	231,683.42	76,064.33	.00	839,416.09
Other Support Costs		179,122.80	112,557.07	100,832.96	108,984.42	118,147.56	619,644.81
Internal Funding Subtotal		559,664.89	513,873.03	635,092.38	522,969.75	197,081.31	2,428,681.36
External Funding							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		7,500.00	291,000.00	.00	.00	.00	298,500.00
Civilian Salary Costs		123,000.00	109,870.00	.00	.00	.00	232,870.00
Other Support Costs		.00	.00	.00	.00	.00	.00
External Funding Subtotal		130,500.00	400,870.00	.00	.00	.00	531,370.00
Unfunded Requirements		( .00 ) (	.00 ) (	.00 ) (	.00 ) (	.00 ) (	.00 ) (
Total Annual Costs		\$ 690,164.89	\$ 914,743.03	\$ 635,092.38	\$ 522,969.75	\$ 197,081.31	\$ 2,960,051.36
In-House Labor Hours							
Allen	(MILITARY)	14	14	14	14	14	70
Brennaman		116	48	48	48	48	308
Briggs	(MILITARY)	528	528	528			1584
Brinkley		373	373	373			1119
Butman		600	270	208			1078
Downing		173	514	514	514	514	2229
Finegold		1729	1729	1729			5187
Gordon	(MILITARY)	185	208	208			601
Hall		1740	1740	1740			5220
Harris		270	497	497	497	497	2258
Heflin			48	48	48	48	192
Hille		692	312	156			1160
Jacobs	(MILITARY)	240	240	333	963	963	2739
Kaleps		142	142	142			426
Knob		131	125	125			381
Lee		248	312	312	312	312	1496
Lundberg		85	312	312			1333
McCloskey		394					394
Mckinley			208	208	208	208	832
Nixon		151	198	198	406	406	1373
Obergefell		388	428	428			1244
Plaga	(MILITARY)	248	206	92			546
Popper		492	42				534
Potor		168	62	62			292
Rasmussen		280	280	280			840
Skinner		1952	1952	1952			5856

Speakman	311	281	239	1351
Specker	138	138		414
Stephenson	12	12	12	60
Steuer	24	24	337	903
Strzelecki	180	21		201
Toler	40	40		120
Tripp	228			228
Weide	273	273		819
Yeager	230	208	1165	2954
Zember		230		690
Total Hours (Person-Years)	12775 (6.1)	12015 (5.8)	5075 (2.4)	47032

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
3005R101	IMPROVED HAULBACK SYSTEM	Strzelecki	BBP	53122	06-SEP-89	02-APR-90
72312001	Noise Environs/Support	Hille	RBE	53664	01-NOV-76	30-SEP-94
72312002	Support for Noise ADPO	Speakman	RBE	53605	01-MAR-84	30-SEP-94
72312003	Noise Applications	Jacobs	BRA	53609	30-SEP-76	30-SEP-94
72312008	AIRCROW ECCAPE TECHNOLOGY	Specker	BBP	53122	01-OCT-82	30-SEP-92
72312009	Acceleration Stresses	Frazier	BBS	52639	01-MAR-85	30-SEP-92
72312011	Dev of a Stand-Alone Area Network With Zenith Z-100 Computer	Potor	BBS	54096	03-JUN-85	30-DEC-89
72312012	Research Management Support	Weide	BB	53603	01-OCT-85	31-DEC-95
72312013	PREDICT OCCUPANT MOTION	Obergfell	BBM	55963	02-SEP-86	30-SEP-92
72312014	ROLLOVER CRASH DYNAMICS	Obergfell	BBM	55963	01-OCT-86	30-SEP-92
723120AK	OCCUPANT KINEMATICS	kaleps	BBM	53665	02-SEP-86	31-DEC-91
723120AL	VEHICLE & DUMMY DYNAMICS	kaleps	BBM	53665	02-SEP-86	31-DEC-91
723120AR	FY 91 REIMBURSABLE CREST SUPPORT	Zember	BB	53603	01-OCT-87	30-SEP-92
723120AT	IDEF Description	Weide	BB	53603	28-FEB-89	01-OCT-89
723120AW	ENTERPRISE DEVELOPMENT PROCESS	Weide	BB	53603	20-MAR-90	30-SEP-90
723120BA	PROJECT PULL	Weide	BB	53603	01-OCT-90	30-SEP-91
723120BB	NERVE AGENT PROTECTION	Weide	BB	53603	16-NOV-90	30-DEC-92
723120BC	FIBER-OPTIC DISCONNECT	Weide	BB	53603	01-JAN-91	30-SEP-92
723120BD	GRAVITATIONAL STRESS RESEARCH	Weide	BB	53603	01-MAR-91	30-SEP-92
723120CR	CREST CIVILIAN SALARIES	Zember	BB	53603	01-OCT-86	31-DEC-91
723120HM	HMST CIVILIAN SALARY	Zember	BB	53603	01-MAY-91	30-SEP-91
723120NS	NSBIT CIVILIAN SALARIES	Zember	BB	53603	01-OCT-86	31-DEC-91
723120TV	Project Travel Support	Zember	BB	53603	15-SEP-86	30-SEP-92
723120TW	Test Wing Support	Zember	BB	53603	01-OCT-87	30-SEP-92
723120XX	Research Management Support	Weide	BB	53603	09-MAY-88	30-SEP-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
723120--	7595.42	----	SUPPORT COSTS	HSD/6106MD
723120--	20527.38	----	TRAVEL EXPENSES	HSD/6106MD
723120--	223429.32	----	SALARY COSTS	HSD/6106MD
72312012	3922.77	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231

72312012	26900.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312012	28000.00	-----	Non-ADPE Maintenance/F6AM	HSD/7231
72312012	35000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312012	59098.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312012	65000.00	-----	Fred B DeBra/F33657-89-D-	HSD/7231
72312014	22192.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
723120AR	52500.00	-----	SALARY REIMBURSEMENT JP90	HSD/CREST
723120AW	7500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	ASD/ASD
723120AW	10000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/CREST
723120CR	17000.00	-----	SALARY REIMBURSEMENT JP11	ASD/CREST
723120NS	106000.00	-----	SALARY REIMBURSEMENT JP11	ASD/NSBIT
723120TV	4000.00	-----	Registration Fee-Mission	HSD/7231
723120TV	54000.00	-----	Mission travel	HSD/7231
FY 90 TOTAL	742,664.89	-----		
723120--	7982.79	-----	SUPPORT COSTS	HSD/6106MD
723120--	21574.28	-----	TRAVEL EXPENSES	HSD/6106MD
723120--	229305.27	-----	SALARY COSTS	HSD/6106MD
72312012	762.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312012	13500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312012	47994.09	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312012	60000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312014	5754.60	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231

723120AK	62000.00	F33615-85-C-0530	Biodynamic Engineering Support Systems Research Laboratories, Inc.	DOT/DOT
723120AL	60000.00	F33615-85-C-0530	Biodynamic Engineering Support Systems Research Laboratories, Inc.	DOT/DOT
723120AR	60000.00	-----	SALARY REIMBURSEMENT/JP91	HSD/CREST
723120BB	26000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	USAFSAM/2729
723120BC	26000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	USAFSAM/2729
723120BB	44000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	USAFSAM/2729
723120BB	73000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	USAFSAM/2729
723120BC	40000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HSD/YAH
723120BC	40000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HSD/YAH
723120CR	20600.00	-----	SALARY REIMBURSEMENT	ASD/CREST
723120HM	25730.00	-----	SALARY REIMBURSEMENT/JP91	HSD/HMST
723120NS	89270.00	-----	JP1130 ASD-1-1130	ASD/NSBIT
723120TV	5000.00	-----	REGISTRATION FEE	HSD/7231
723120TV	59000.00	-----	Mission travel	HSD/7231
723120TW	9000.00	-----	AF 616 ASD-1-1028, AMD 02	HSD/7231
723120TW	10000.00	-----	AF 616 ASD-1-1019, AMD 01	HSD/7231
FY 01 TOTAL 1,000,473.03				
-----				
723120--	8597.46	-----	SUPPORT COSTS	HSD/6106MD
723120--	23235.50	-----	TRAVEL EXPENSES	HSD/6106MD
723120--	231683.42	-----	SALARY COSTS	HSD/6106MD
72312012	302576.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
723120TV	4000.00	-----	Registration Fees	HSD/7231
723120TV	65000.00	-----	Mission Travel	HSD/7231

FY 92 TOTAL		635,092.38		
723120--	9448.61	----	SUPPORT COSTS	HSD/6106MD
723120--	25535.81	----	TRAVEL EXPENSES	HSD/6106MD
723120--	76064.33	----	SALARY COSTS	HSD/6106MD
72312012	337921.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
723120TV	4000.00	----	Registration Fee	HSD/7231
723120TV	70000.00	----	Mission Travel	HSD/7231
FY 93 TOTAL		522,969.75		
723120--	10572.99	----	SUPPORT COSTS	HSD/6106MD
723120--	28574.57	----	TRAVEL EXPENSES	HSD/6106MD
723120--	78933.75	----	SALARY COSTS	HSD/6106MD
723120TV	4000.00	----	Registration Fee	HSD/7231
723120TV	75000.00	----	Mission Travel	HSD/7231
FY 94 TOTAL		197,081.31		

5 YEAR TOTAL 3,090,281.36

***** ENHANCEMENTS *****				
***** PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR *****				
IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90092	A214619	TECHNICAL REPORT	Kaleps, I Rizer, A L	Simulation of Vehicle Crash and Rollover Dynamics
***** PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES *****				
***** TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR *****				



\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: HSD 9030/63215f, USAF SON 1-81, HSD 63-202F

CUSTOMERS: USAF/LEE, AFESC/DEV, AFWA/PL, USAF/SG, MAJCOMs

MAJOR EQUIPMENT: Spectral Analyzer, Hewlett Packard and Perkin Elmer Computers, Acoustic Data Acquisition Systems, NOISEBANK

FACILITIES: Building 441, Building 824, Building 33, Mobile Acoustic Laboratory

Biocommunications

TASK MANAGER: Richard L McKinley  
BBA - AV 785-3607

TASK NUMBER: 723121

OBJECTIVE:

to enable and enhance Air Force voice communications by conducting applied research with the human operator in the loop.

BACKGROUND:

1. Thrust research activities must draw upon a firm scientific foundation consisting of technological advancements and contemporary research. This task provides the basic knowledge and experience which allow other programs to succeed. In addition, this core effort provides the required facilities, with appropriate upgrades, to support multifaceted research and technology development programs.
2. Current efforts under this task include: (1) Enhancing the audio communications performance of current systems as well as impacting those in various stages of development, (2) researching the various elements of voice warning and automatic speech recognition in military applications, (3) studying the effects of acoustic energy on people and methods of protection, (4) development of personal active noise reduction technology for application in all sound protection/communications situations where it is appropriate, (5) researching voice under various degrees of task loading, (6) researching voice communication optimizing elements such as bandwidth, transmission rate, and the like, in digital communication systems and (7) developing and maintaining state-of-the art voice communications research methodology, instrumentation and facilities.

# AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 723121

TASK TITLE: Biocommunications

MIS CATEGORY: Core

MANAGER: Mckinley OFFICE: BBA PHONE: 53607 START: 01-OCT-78 STOP: 30-SEP-94 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	48,240.00	.00	.00	.00	.00	48,240.00
On-Site Contract Costs	338,344.00	333,661.60	357,459.00	314,156.00	320,365.00	1,663,985.60
Civilian Salary Costs	62,119.15	62,589.63	74,405.60	.00	.00	199,114.38
Other Support Costs	86,485.36	62,197.20	75,108.81	78,063.77	83,248.43	385,103.57
Internal Funding Subtotal	535,188.51	458,448.43	506,973.41	392,219.77	403,613.43	2,296,443.55
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	197,592.26	.00	.00	.00	197,592.26
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	197,592.26	.00	.00	.00	197,592.26
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 535,188.51	\$ 656,040.69	\$ 506,973.41	\$ 392,219.77	\$ 403,613.43	\$ 2,494,035.81
In-House Labor Hours						
Alien	1398	1441	1441			4280
Anderson	6	27	27			6
Brinkley	27	416	416			81
Ericson	546	114	114			1378
Gillespie	231	611	517			345
Jacobs	611	583	583			1739
Mckinley	674	416	416			1840
Nixon	422	1144	1560			1254
Obert	1382	64	364			4086
Stephenson	212	212				192
Steuer	45	1498	749			788
Watkins	1561	957				45
West	518					4557
Yeager						2224
Total Hours (Person-Years)	7697 (3.7)	7483 (3.6)	7635 (3.7)	(.0)	(.0)	22815

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
3005B108	FIBER OPTIC MICROPHONE	Mckinley	BBA	53607	07-MAY-90	30-SEP-91
72312101	Voice Comm Analysis & Evaluation	Mckinley	BBA	53607	01-OCT-78	10-OCT-91
72312104	Bioacoustics and Biocommunications	Mckinley	BBA	53607	01-OCT-84	30-SEP-92
72312106	Automatic Intelligibility Measure	Mckinley	BBA	53607	01-OCT-87	30-SEP-92
72312108	Bioacoustic Research Subjects	Mckinley	BBA	53607	16-JAN-89	30-SEP-94
723121AD	PIHM INTELLIGIBILITY TEST	Mckinley	BBA	53607	05-JUL-90	30-SEP-90

723121AE VOCODERS RHYME TESTING  
 723121AF TALON II MICROPHONE DEVELOPMENT  
 723121AG HGU-53/P FLYER'S HELMET COMM TESTS  
 723121AD Advanced Active Noise Red  
 723121XX BioAcoustics Research Participants

McKinley BBA 53607 02-JAN-91 30-SEP-91  
 Steuver BBA 54244 15-JAN-91 30-DEC-91  
 McKinley BBA 53607 01-FEB-91 30-SEP-92  
 McKinley BBA 53607 31-AUG-87 30-SEP-92  
 McKinley BBA 53607 01-SEP-89 30-SEP-94

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
30058108	48240.00	F41622-90-C-1014	Fiber Optic Microphone Development Micro-Optics Technologies, Inc	HSD/3005
723121--	14946.91	----	SUPPORT COSTS	HSD/6106MD
723121--	62119.15	----	SALARY COSTS	HSD/6106MD
72312101	2232.00	----	Lease/Rental of Hardware/	HSD/7231
72312101	5256.00	----	ADPE MAINTENANCE - F7AMRL	HSD/7231
72312101	5750.00	----	ADPE MAINTENANCE - F7AMRL	HSD/7231
72312101	8316.00	----	Lease/Rental of Hardware/	HSD/7231
72312101	10220.40	----	Lease/Rental of Hardware/	HSD/7231
72312101	13800.00	----	ADPE MAINTENANCE - AAMRLC	HSD/7231
72312101	25964.05	----	Lease/Rental of Hardware/	HSD/7231
72312101	33500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/VIC
72312101	100000.00	F33515-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312101	106844.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312108	90000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
723121AD	10000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HSD/VACD
723121AD	535,188.51			

723121--	15709.20	----	SUPPORT COSTS	HSD/6106MD
723121--	62589.63	----	SALARY COSTS	HSD/6106MD
72312101	1608.00	----	AAMRLC-90-06601/F33600-91	HSD/7231

72312104	2232.00	-----	Software Maintenance/AAMR	HSD/7231
72312104	4077.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312104	5352.00	-----	Software Maintenance/F7AM	HSD/7231
72312104	6000.00	-----	ADPE MAINTENANCE/F7AMRL00	HSD/7231
72312104	13656.00	-----	Software Maintenance/AAMR	HSD/7231
72312104	17640.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7231
72312104	30800.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312104	51500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HSD/YA
72312104	45000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312104	94824.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312104	183110.60	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
723121AE	10000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	WRDC/WRDC
723121AF	187592.26	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	ASD/ASD
723121AG	9800.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HSD
723121AG	10200.00	-----	JP2003 HSD-1-2003	HSD/HSD
FY 91 TOTAL	731,690.69			
723121--	16918.81	-----	SUPPORT COSTS	HSD/6106MD
723121--	74405.60	-----	SALARY COSTS	HSD/6106MD
72312104	58190.00	-----	Maintenance Contracts 6	HSD/7231
72312104	135000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312104	222459.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 92 TOTAL	506,973.41			

723121--	18593.77	-----	SUPPORT COSTS	HSD/6106MD
72312104	59470.00	-----	Maintenance Contracts 6	HSD/7231
72312104	140000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312104	174156.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 93 TOTAL	392,219.77			

723121--	20806.43	-----	SUPPORT COSTS	HSD/6106MD
72312104	62442.00	-----	Maintenance Contract 6	HSD/7231
72312104	145000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312104	175365.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 94 TOTAL	403,613.43			

5 Y AR TOTAL 2,569,685.81

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90095	A213934	SPECIAL REPORT	DaPolito, K L Jones, M E Hottman, S B	Operator Performance Measures for Assessing Voice Communication Effectiveness
90191		ABSTRACT	Nixon, C W McKinley, R L Steuver, J W	Performance of Active Noise Reduction Headsets
90265		PROCEEDINGS	Nixon, C W McKinley, R L Steuver, J W	Performance of Active Noise Reduction Headsets
90266		ORAL PRESENTATION	Nixon, C W McKinley, R L Steuver, J W	Performance of Active Noise Reduction Headsets
90057		ABSTRACT	Stephenson, M R Billings, B L	Voyager Flight Crew Hearing Threshold Levels Resulting From Five and Nine Day Continuous In-Flight Noise

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
Rockwell International Corp./Avionics Adv Tech	Artificial Intelligence Applications	Anderson
McDonnell Douglas Missile Systems Company	Artificial Intelligence Applications	Anderson
Ford Aerospace Corporation, Space Missions Group	Low Cost Digital Voice Intercom Syst.User Interfac	Steuer
Johns Hopkins University, Applied Physics Lab	Artificial Intelligence	Anderson
GTE Laboratories	Human Speech Understanding	Anderson
GTE Laboratories	New Services Speech Technologies	Anderson
GTE Laboratories	Adv.Communication Architectures & Technologies	Anderson
IBM Systems Integration Division	Expert Systems in Real-Time Command and Control	Anderson
General Dynamics Corp - Electronics Division	Communication System Real-Time Software Analysis	Anderson
General Dynamics, Fort Worth Division	Advanced Cockpits Crew Accomodation	McKinley
General Dynamics, Fort Worth Division	Advanced Cockpits control and Display Technologies	McKinley
General Dynamics, Fort Worth Division	Artificial Intelligence Applications for Sprtblty	Anderson
General Dynamics, Fort Worth Division	Cockpit Configuration Development	McKinley
Lockheed Aeronautical Systems Company	Artificial Intelligence in Computer-Aided Engrg.	Anderson
Lockheed Aeronautical Systems Company	Advanced Crew Station technologies Development	McKinley
Boeing Aerospace & Electronics	Active Noise - Vibration Control	McKinley
Lockheed Sanders	Speech Processing in Noisy Environments	Anderson

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: MOA AFHRL-RADC 9-24-81, MOA AAMRL-NORAD, PMD-R-P-2030(13)/64706F, SAC GOR 205-78, HQ USAF SON 4-81, RADC Project 5581, IAF/ROC 321-75, etc.

CUSTOMERS: ASD/AESO, RADC, AAMRL, SAC, IAC, USN/NAC

MAJOR EQUIPMENT: HP-9845, HP-9836, ANR Test Booth, MICRO VAX

FACILITIES: Building 441, Voice Communication Research & Eval System, Performance & Comm Research & Tech Facility



Escape Accident/Injury Analysis and Exposure Criteria

TASK MANAGER: Leon E Kazarian  
BBM - AV 785-2913

TASK NUMBER: 723122

OBJECTIVES:

1. To define regional and whole-body human tolerance to complex mechanical forces experienced throughout the spectrum of aerospace flight.
2. To develop an epidemiological, biomechanical, and kinematic data base of information to aid in evaluating, simulating and predicting injury potential resulting from emergency escape, parachute opening shock and crash forces.
3. To acquire information on the subjective effects of combined axis vibration in linear, angular and combined linear and angular modes for upgrading aircrew proficiency and performance while decreasing aircrew fatigue.
4. To identify, comparatively evaluate and extend acceptable whole-body vibration boundaries based upon the International Standard Organization ISO -2631, The American National Standard ANSI 53.18, 1979, and Military Specifications MIL-A-8892, Vibration and Shock - Mechanical Driving Point Impedance of the Human Body, ISO 5982.
5. To provide expert consultation in determining the etiology of operational injuries to DoD safety boards and the USAF/JAG.
6. To test and evaluate prototype life support systems and develop specifications and design criteria for combined test conditions of noise and vibration.

TASK TITLE: Escape Accident/Injury Analysis and Exposure Criteria

MIS CATEGORY: Core

MANAGER: kazarian OFFICE: BBM PHONE: 52913 START: 15-JUN-80 STOP: 30-DEC-92 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	38,845.00	2,200.00	.00	.00	.00	41,045.00
Civilian Salary Costs	93,100.70	35,783.68	.00	.00	.00	128,884.38
Other Support Costs	2,995.62	11,532.24	379.90	417.51	467.19	15,792.46
Internal Funding Subtotal	134,941.32	49,515.92	379.90	417.51	467.19	185,721.84
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 134,941.32 \$	49,515.92 \$	379.90 \$	417.51 \$	467.19 \$	185,721.84
In-House Labor Hours						
Bausman	78	42				120
Baver	541					541
Cooper	50					100
Eveland	1595	244				1839
Smith	1536	1286				2822
Souder	1743	208				1951
Young	136	25				161
Total Hours (Person-Years)	5679 (2.7)	1855 (.9)	(.0)	(.0)	(.0)	7534

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
72312203	Biomaterials/Kinematics	Smith	BBM	53242	01-MAY-82	30-DEC-92
72312208	Vibration/Combined Axis	Smith	BBM	53242	15-JUN-80	10-OCT-90
72312212	DEA-Norway (EPA X-rays)	Baver	BBM	53242	09-OCT-84	30-SEP-90
72312213	Radio-graph Repository	Baver	BBM	53242	01-MAR-85	30-SEP-90
72312214	Biohistodynamics	Eveland	BBM	53242	01-MAY-85	30-SEP-90
72312219	DEA ISRAEL, LOW BACK PAIN	Hayes	BBM	53242	29-JUN-87	10-OCT-90
72312220	SIMULA HELICOPTER CUSHION STUDY	Smith	BBM	53242	02-MAY-88	21-FEB-90
72312201	Sinusoidal vs Stochastic Vibration	Smith	BBM	53242	01-OCT-86	30-SEP-91
72312203	HUMAN RESPONSE SIN VS Stoch	Smith	BBM	53242	01-OCT-87	30-SEP-91
72312204	Use Of a Porous Implant	Eveland	BBM	53242	14-AUG-87	30-JUN-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR ( IF KNOWN)	FUND SOURCE
723122--	335.62	-----	SUPPORT COSTS	HSD/6106MD
723122--	93100.70	-----	SALARY COSTS	HSD/6106MD
72312203	.00	-----	Non-ADPE Maintenance -F7A	HSD/7231
72312203	1232.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312203	2063.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312203	2650.00	-----	Non-ADPE Maintenance - F7	HSD/7231
72312203	17530.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312203	18000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 90 TOTAL	134,941.32			
723122--	352.74	-----	SUPPORT COSTS	HSD/6106MD
723122--	35783.68	-----	SALARY COSTS	HSD/6106MD
72312203	1702.50	-----	Software Maintenance/F7AM	HSD/7231
72312203	2200.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312203	2477.00	-----	F2AMRL10770100/F33601-9*-	HSD/7231
72312203	7000.00	-----	Svc Contract/F6AMRL108101	HSD/7231
72312203	42800.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 91 TOTAL	92,315.92			
723122--	379.90	-----	SUPPORT COSTS	HSD/6106MD
FY 92 TOTAL	379.90			
723122--	417.51	-----	SUPPORT COSTS	HSD/6106MD
FY 93 TOTAL	417.51			

5 YEAR TOTAL 228,521.84

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90161		ABSTRACT	Eveland, E S Cooper, J R Palomino, D A Bajpai, P K	Calcium Phosphate Ceramic Cysteine Composite Bone Substitutes
90346		ORAL PRESENTATION	Eveland, E S Cooper, J R Palomino, D A Bajpai, P K	Calcium Phosphate Ceramic Cysteine Composite Bone Substitutes
90162		ABSTRACT	Eveland, E S Cooper, J R Palomino, D A Bajpai, P K	Calcium Phosphate Ceramic Malic Acid Composite Bone Substitutes
90345		ORAL PRESENTATION	Eveland, E S Cooper, J R Palomino, D A Bajpai, P K	Calcium Phosphate Ceramic Malic Acid Composite Bone Substitutes

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

## COMPANY

Northrop Corporation, Aircraft Division

## IRAD TOPIC

Vibration/Shock Methods

## EVALUATOR

Smith

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: DG IW-3, DG IW-5, DG SD-1, MIL STD 1472C, AFSCHD 1-3, Life Support Master Plan, IAF SON 322,79, PE 64705f/412A, ACES II Upgrade

CUSTOMERS: 412A SPO, Navy, USAFRL, USARIL, FAA, AFISC/SEL, IAC/SG, NASA Ames, DOI, AGARD, WG-11, ASCC, WP-61, MSC/SGPA, etc.

MAJOR EQUIPMENT: SIXMODE, Hydraulic Power Supply, C-5 Vibration Device, Mercury Shaker, Monomode Vibration System

FACILITIES: Building 824, Noise/Vibration Facility, Pathomechanics Laboratory

## Human Dynamics in Multiforce Environments

TASK MANAGER: Lits Kaleps  
B3M - AV 785-3665

TASK NUMBER: 723123

### OBJECTIVE:

To develop evaluation methods and criteria for human tolerance to mechanical forces associated with Air Force operational requirements.

### BACKGROUND:

Specific technical efforts involve development of biodynamic models; compilation of data bases for these models and their validation; application of these models in generic or specific system studies; and experimental data reduction and analysis. Current areas of research include:

a. HUMAN KINEMATICS AND DYNAMICS MODELING: This effort addresses the development and application of predictive computer based models for human response and injury assessment in various mechanical force environments encountered in aerospace environments. Primary emphasis is on modeling the spine structure and gross body articulated motion. Application areas include: prediction of man/seat center-of-mass shifting during ejection; evaluation of harness system design parameters; cockpit clearance during ejection assessment; robotic teleoperator interface design, and prediction of spinal loading during ejection as a function of acceleration, restraint and initial body position.

b. BIODYNAMICS DATA BANK: This effort provides for the development of a biodynamics data bank which would provide automated and searchable index files on AAMRI-generated biodynamics data and biodynamics bibliographies.

c. HUMAN AND MANIKIN DATA BASES FOR MODELING AND DESIGN: This effort provides for the generation, compilation, analysis and application of data bases describing human body and mechanical analog properties. These consist of anthropometric dimensional and surface shape; segmented inertial distributions; joint type, location and motion resistive property; joint spatial kinematics; body surface force-deflection property; and spinal geometry data. In addition to the data, analysis methods have been and are being developed to enhance user access and automated data set generations for different populations and various manikins used in impact/crash testing and evaluation.

d. INERTIAL LOADING EFFECTS OF HEAD ENCUMBERING DEVICES: New life support, protection and performance enhancement systems pose potential hazards to aircrew during ejection or crash environments and, possibly, during high G maneuvers. Increases in helmet weight alone can have significant effects on the loads developed in the spine, particularly in the cervical region. This program takes a combined experimental and analytical approach, making use of our impact and manikin test facilities and our mathematical models of the human head-spine structure to address this problem. The overall objective of this effort is to obtain estimates of the severity of the inertial loading associated with various helmet-mounted devices and provide guidelines for allowable loading and exposure levels.

TASK TITLE: Human Dynamics in Multiforce Environments

MIS CATEGORY: Core

MANAGER: Kapeles

OFFICE: BHM

PHONE: 53665

START: 15-MAY-78

STOP: 30-SEP-99

PRIMARY PROGRAM ELEMENT: 52020F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED		FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
<b>Internal Funding</b>							
Off-Site Contract Costs		135,300.00	256,300.00	.00	.00	.00	371,400.00
On-Site Contract Costs		93,719.00	252,263.50	273,212.00	214,875.00	.00	967,856.50
Civilian Salary Costs		99,084.44	202,819.09	245,977.99	262,901.79	270,788.85	1,081,572.16
Other Support Costs		46,800.49	82,649.34	2,549.91	21,604.85	22,686.37	176,330.96
<b>Internal Funding Subtotal</b>		<b>374,743.93</b>	<b>774,031.93</b>	<b>462,314.90</b>	<b>497,718.64</b>	<b>508,350.22</b>	<b>2,597,159.62</b>
<b>External Funding</b>							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		332,151.00	330,850.00	.00	.00	.00	663,001.00
Civilian Salary Costs		.00	.00	.00	.00	.00	.00
Other Support Costs		4,667.00	439.00	.00	.00	.00	5,106.00
<b>External Funding Subtotal</b>		<b>336,818.00</b>	<b>331,289.00</b>	<b>.00</b>	<b>.00</b>	<b>.00</b>	<b>668,107.00</b>
<b>Unfunded Requirements</b>		<b>.00</b>	<b>.00</b>	<b>.00</b>	<b>.00</b>	<b>.00</b>	<b>.00</b>
<b>Total Annual Costs</b>		<b>\$ 711,561.93</b>	<b>\$ 1,105,320.93</b>	<b>\$ 462,314.90</b>	<b>\$ 497,718.64</b>	<b>\$ 508,350.22</b>	<b>\$ 3,265,266.62</b>
<b>In-House Labor Hours</b>							
Action		440	45	45	1872	1872	440
Brinkley		45	1664	1664			135
Colman	(MILITARY)						7072
DeGroom	(MILITARY)	654					654
Evland							928
Gordon	(MILITARY)	80	416	512			704
Kapeles		537	312	312			2285
Kazarian			441	441			6932
Kline	(MILITARY)	282	1664	1756			4004
Oberegelli		1473	666	666			8061
Overson		1726	1433	1433			8630
Rasmussen		577	1726	1726			2309
Smith			245	245			4858
Souder			250	1536			6764
Speltz	(MILITARY)	450	1535	1743			1638
Taylor	(MILITARY)	764	450	450			33
<b>Total Hours (Person-years)</b>		<b>6762 (1.3)</b>	<b>10847 (6.3)</b>	<b>12529 (6.3)</b>	<b>24474 (6.3)</b>	<b>24474 (6.3)</b>	<b>58240</b>

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORK UNIT TITLE

72312301 Impact Response Models

72312302 Biodynamic Data Bank

72312303 Head Translance Effects

72312304 Interactive Data Bases

WORK UNIT

Kapeles

Kapeles

Kapeles

Kapeles

START DATE

15-MAY-78

30-SEP-99

30-SEP-99

30-SEP-99



WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
72312312			FLD Simulation	
72312314			ATB Biodynamic Modeling	
72312315			Interactive Data Bases	
72312316			Live Fore Test	
72312317			Micro Based System Phase II	
72312318			Roll Over Injury Potential	
72312319			Supp of ATB Model Project	
72312320			Injury Mitigation to Roll Over Crashes	
72312321			ATB Ejection Seat Analysis	
72312322			ATB Ejection Research	
72312323			ATB Suzuki Motor Company	
72312324			ATB Biodynamic Engineering	
72312325			Articulated Body Study (ATB) Honda R&D Study	
72312326			Articulated Body Study (ATB) Honda R&D Study	
72312327			Articulated Body Study (ATB) Honda R&D Study	
72312328			Articulated Body Study (ATB) Honda R&D Study	
72312329			Articulated Body Study (ATB) Honda R&D Study	
72312330			Articulated Body Study (ATB) Honda R&D Study	
72312331			Articulated Body Study (ATB) Honda R&D Study	
72312332			Articulated Body Study (ATB) Honda R&D Study	
72312333			Articulated Body Study (ATB) Honda R&D Study	
72312334			Articulated Body Study (ATB) Honda R&D Study	
72312335			Articulated Body Study (ATB) Honda R&D Study	
72312336			Articulated Body Study (ATB) Honda R&D Study	
72312337			Articulated Body Study (ATB) Honda R&D Study	
72312338			Articulated Body Study (ATB) Honda R&D Study	
72312339			Articulated Body Study (ATB) Honda R&D Study	
72312340			Articulated Body Study (ATB) Honda R&D Study	
72312341			Articulated Body Study (ATB) Honda R&D Study	
72312342			Articulated Body Study (ATB) Honda R&D Study	
72312343			Articulated Body Study (ATB) Honda R&D Study	
72312344			Articulated Body Study (ATB) Honda R&D Study	
72312345			Articulated Body Study (ATB) Honda R&D Study	
72312346			Articulated Body Study (ATB) Honda R&D Study	
72312347			Articulated Body Study (ATB) Honda R&D Study	
72312348			Articulated Body Study (ATB) Honda R&D Study	
72312349			Articulated Body Study (ATB) Honda R&D Study	
72312350			Articulated Body Study (ATB) Honda R&D Study	
72312351			Articulated Body Study (ATB) Honda R&D Study	
72312352			Articulated Body Study (ATB) Honda R&D Study	
72312353			Articulated Body Study (ATB) Honda R&D Study	
72312354			Articulated Body Study (ATB) Honda R&D Study	
72312355			Articulated Body Study (ATB) Honda R&D Study	
72312356			Articulated Body Study (ATB) Honda R&D Study	
72312357			Articulated Body Study (ATB) Honda R&D Study	
72312358			Articulated Body Study (ATB) Honda R&D Study	
72312359			Articulated Body Study (ATB) Honda R&D Study	
72312360			Articulated Body Study (ATB) Honda R&D Study	
72312361			Articulated Body Study (ATB) Honda R&D Study	
72312362			Articulated Body Study (ATB) Honda R&D Study	
72312363			Articulated Body Study (ATB) Honda R&D Study	
72312364			Articulated Body Study (ATB) Honda R&D Study	
72312365			Articulated Body Study (ATB) Honda R&D Study	
72312366			Articulated Body Study (ATB) Honda R&D Study	
72312367			Articulated Body Study (ATB) Honda R&D Study	
72312368			Articulated Body Study (ATB) Honda R&D Study	
72312369			Articulated Body Study (ATB) Honda R&D Study	
72312370			Articulated Body Study (ATB) Honda R&D Study	
72312371			Articulated Body Study (ATB) Honda R&D Study	
72312372			Articulated Body Study (ATB) Honda R&D Study	
72312373			Articulated Body Study (ATB) Honda R&D Study	
72312374			Articulated Body Study (ATB) Honda R&D Study	
72312375			Articulated Body Study (ATB) Honda R&D Study	
72312376			Articulated Body Study (ATB) Honda R&D Study	
72312377			Articulated Body Study (ATB) Honda R&D Study	
72312378			Articulated Body Study (ATB) Honda R&D Study	
72312379			Articulated Body Study (ATB) Honda R&D Study	
72312380			Articulated Body Study (ATB) Honda R&D Study	
72312381			Articulated Body Study (ATB) Honda R&D Study	
72312382			Articulated Body Study (ATB) Honda R&D Study	
72312383			Articulated Body Study (ATB) Honda R&D Study	
72312384			Articulated Body Study (ATB) Honda R&D Study	
72312385			Articulated Body Study (ATB) Honda R&D Study	
72312386			Articulated Body Study (ATB) Honda R&D Study	
72312387			Articulated Body Study (ATB) Honda R&D Study	
72312388			Articulated Body Study (ATB) Honda R&D Study	
72312389			Articulated Body Study (ATB) Honda R&D Study	
72312390			Articulated Body Study (ATB) Honda R&D Study	
72312391			Articulated Body Study (ATB) Honda R&D Study	
72312392			Articulated Body Study (ATB) Honda R&D Study	
72312393			Articulated Body Study (ATB) Honda R&D Study	
72312394			Articulated Body Study (ATB) Honda R&D Study	
72312395			Articulated Body Study (ATB) Honda R&D Study	
72312396			Articulated Body Study (ATB) Honda R&D Study	
72312397			Articulated Body Study (ATB) Honda R&D Study	
72312398			Articulated Body Study (ATB) Honda R&D Study	
72312399			Articulated Body Study (ATB) Honda R&D Study	
72312400			Articulated Body Study (ATB) Honda R&D Study	

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
723123--	44.09	----	SUPPORT COSTS	HSD/6106MD
723123--	99084.44	----	SALARY COSTS	HSD/6106MD
72312301	1407.60	----	ADPE MAINTENANCE - AAMRLC	HSD/7231
72312301	2692.80	----	ADPE MAINTENANCE - F7AMRI	HSD/7231
72312301	14213.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312301	17700.60	----	ADPE MAINTENANCE - AAMRLC	HSD/7231
72312301	24996.00	----	ADPE MAINTENANCE - AAMRLC	HSD/7231
72312301	40000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312309	.09	F33615-87-C-0530	Biodynamic Model Interactive Data Base Support & Development Beecher Research Company	HSD/7231
72312309	6613.91	F33615-87-C-0530	Biodynamic Model Interactive Data Base Support & Development Beecher Research Company	HSD/7231
72312309	32892.00	F33615-87-C-0530	Biodynamic Model Interactive Data Base Support & Development Beecher Research Company	HSD/7231

72312317	135100.00	F33615-90-C-0531	Dev of Microcomputer Based Software Sys for Crewmember Eject Anal General Engineering & Systems Anal Co.	HSD/3005
723123AD	46000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DOT/DOT
723123AG	168401.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DOT/DOT
723123AJ	600.00	-----	JM1165 AIB CHECK-MICHIGAN	MICHIGAN/MI
723123AL	121.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	CALIF/CALIF
723123AM	479.00	-----	JM2931 CHECK FROM LIABILI	CALIF/CALIF
723123AN	600.00	-----	JM2447 CHECK-JAPAN #00563	JAPAN/JAPAN
723123AP	1000.00	-----	Supplies/Equipment	MI/MI
723123AR	561.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	JAPAN/JAPAN
723123AS	5.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	ATB/MI
723123AT	995.00	-----	JM1591 AIB CK NO. 1591	ATB/MI
723123AU	94750.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DOT/DOT
723123AV	306.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	MI/MI
723123AW	1000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	INDUS/INDUS
723123AX	7.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	MI/MI
723123AY	993.00	-----	JM4635	MI/MI
723123AZ	21000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	NAVY/NAVY
723123BA	711,561.93	-----		
723123BB	46.34	-----	SUPPORT COSTS	HSD/6106MD
723123BC	202819.09	-----	SALARY COSTS	HSD/6106MD
723123BD	1234.20	-----	ADPE MAINTENANCE/F7AMRI01	HSD/7231
723123BE	1436.40	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7231

72312301	1728.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312301	6057.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312301	6600.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312301	11206.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312301	11643.00	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7231
72312301	13000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312301	13500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312301	14045.40	-----	ADPE MAINTENANCE/AAMRLC-9	HSD/7231
72312301	17372.50	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312301	31500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312301	47800.00	F33615-91-C-0531	Impact Research Facilities Operation & Maintenance DYNORP-TEST & EVALUATION DIVISIONS	HSD/7231
72312301	54244.00	-----	AAMRLB9100094	HSD/7231
72312317	236300.00	F33615-90-C-0531	Dev of Microcomputer Based Software Sys For Crewmember Eject Anal General Engineering & Systems Anal Co.	HSD/3005
723123AP	439.00	-----	JM7280 CK 006-DDS-167280	JAPAN/JAPAN
723123AS	2500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DOT/DOT
723123AS	6000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DOT/DOT
723123AS	40750.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DOT/DOT
723123AS	90000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DOT/DOT
723123AS	141000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DOT/DOT
723123AY	7600.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	USCG/USCG
723123AY	43000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	USCG/USCG

72312380	13500.00	F33615-89-C-0574	Systems Research Laboratories, Inc	HSD/USAFSAM
			Engineering Support, Biodynamic Research	
			Systems Research Laboratories, Inc	
72312380	90000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research	HSD/USAFSAM
			Systems Research Laboratories, Inc	

FY 91 TOTAL 1,105,320.93

723123--	49.91	----	SUPPORT COSTS	HSD/6106MD
723123--	245977.99	----	SALARY COSTS	HSD/6106MD
72312301	2500.00	----	Maintenance Contracts 1	HSD/7231
72312301	193787.00	F33615-89-C-0574	Engineering Support, Biodynamic Research	HSD/7231
			Systems Research Laboratories, Inc	

FY 92 TOTAL 442,314.90

723123--	54.85	----	SUPPORT COSTS	HSD/6106MD
723123--	262901.79	----	SALARY COSTS	HSD/6106MD
72312301	21550.00	----	Maintenance Contracts 2	HSD/7231
72312301	213212.00	F33615-89-C-0574	Engineering Support, Biodynamic Research	HSD/7231
			Systems Research Laboratories, Inc	

FY 93 TOTAL 497,718.54

723123--	61.37	----	SUPPORT COSTS	HSD/6106MD
723123--	270788.85	----	SALARY COSTS	HSD/6106MD
72312301	22625.00	----	Maintenance Contracts 6	HSD/7231
72312301	214875.00	F33615-89-C-0574	Engineering Support, Biodynamic Research	HSD/7231
			Systems Research Laboratories, Inc	

FY 94 TOTAL 508,350.22

5 YEAR TOTAL 3,265,266.62

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

FY 90 2,0000.00 COST TITLE / PAYOFF / PARTIAL COSTS  
TITLE: Guidelines for Allowable Inertial Loading of Head/Helmet Mounted Devices

PAYOFF: Guidelines for design and hazard assessment for night vision goggles, integrated visually coupled systems, chemical protection equipment and any other head/helmet mounted equipment.  
PARTIAL COSTS: (FY 90, \$140K; FY 91, \$130K)

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90251	OTHER - UPDATE	AAMRL/BBM	Articulated Total Body Model Upgrades; AIB-IV.2	
90096	DRAFT SR	Rangarajan, N	Development of a Microcomputer Based Software System for Use In Crewmember Ejection Analysis	
90306	DRAFT TR	Spiegel, A Hyslop, R	Microcomputer Enhancement of the Articulated Total Body (AIB) Biodynamic Modeling System	
90033	ABSTRACT	Avula, J R kalaps, I	Robotic Telepresence: The Human-Robot Interface	
90339	ABSTRACT	Avula, X J kalaps, I Gergefelli, L	Work Space Calculation of a Robotic Arm Using the Articulated Total Body Model	

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: DG TW-4/1, DG TW-5/1, DG TW-6/1, AFFDL Tech Plan

CUSTOMERS: ASD/EN, ASD/AES, ASD/YC, HSD/YA, DOT

MAJOR EQUIPMENT: Perkin-Elmer 3240 Computer, Biodynamic Data Reduction System (BDRS)

FACILITIES: Building 441, Building 824 (Manikin Testing Laboratory)

Aeromedical Criteria for Escape Systems

TASK MANAGER: Cynthia N Taylor  
BBP - AV 785-3122

TASK NUMBER: 723124

OBJECTIVES:

1. To define short-duration acceleration exposure limits for the design, test, and evaluation of emergency escape systems.
2. To develop criteria for the design, test, and evaluation of windblast protection systems.
3. To provide thermal exposure limits, test methods, and evaluation techniques for the development of side-by-side ejection seats and advanced high-mach escape systems.

BACKGROUND:

This task was initiated in FY84 to provide the human test data base required to develop acceleration and windblast exposure limit models and personnel protection system design standards. The efforts under this task are primarily conducted in-house using our impact research facilities.

TASK TITLE: Aeromedical Criteria for Escape Systems

MIS CATEGORY: Core

MANAGER: Taylor OFFICE: BBP PHONE: 53122 START: 03-OCT-83 STOP: 30-JUN-94 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED		FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
<b>Internal Funding</b>							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		228,288.00	95,532.00	193,000.00	193,000.00	193,000.00	902,820.00
Civilian Salary Costs		76,558.02	81,454.63	76,123.42	203,249.78	206,050.47	643,436.32
Other Support Costs		15,944.15	24,460.30	5,596.42	6,150.46	6,882.37	59,033.70
Internal Funding Subtotal		320,790.17	201,446.93	274,719.84	402,400.24	405,932.84	1,605,290.02
<b>External Funding</b>							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		.00	.00	.00	.00	.00	.00
Civilian Salary Costs		49,000.00	.00	.00	.00	.00	49,000.00
Other Support Costs		55,000.00	.00	.00	.00	.00	55,000.00
External Funding Subtotal		104,000.00	.00	.00	.00	.00	104,000.00
Unfunded Requirements	(	.00)	.00)	.00)	.00)	.00)	.00)
Total Annual Costs	\$	424,790.17	\$ 201,446.93	\$ 274,719.84	\$ 402,400.24	\$ 405,932.84	\$ 1,709,290.02
<b>In-House Labor Hours</b>							
Blake	(MILITARY)	158	158	158			474
Bonetti	(MILITARY)	1006	998	1061	1040	1040	5145
Briggs	(MILITARY)	960	960	960	1720	1720	6320
Brinkley		176	176	176	176	176	880
Buhrman		633	738	759	1716	1695	5541
Esken		40	42	42	42	42	208
Getschow	(MILITARY)	55	55				110
Gordon	(MILITARY)	2	208	208	624	624	1666
Knox		489	500	441	940	940	3310
Lashley	(MILITARY)	40	40	40	767	767	1654
Maldonado	(MILITARY)		306	306	1138	1138	2888
Newsome	(MILITARY)	42	42				84
Perry		517	291		1477	1477	3762
Plaiga		629	216	96	356	218	1515
Smith	(MILITARY)	218					218
Specker		387	387	387	583	564	2308
Strzelecki		639	1041	1145	1877	1877	6579
Taylor	(MILITARY)	284	284	284	750	750	2352
Toler		147	147	147	1533	1533	3507
Tong	(MILITARY)		312	312	728	728	2080
Tripp	(MILITARY)	62					62
Tucker	(MILITARY)	41					41
Total Hours (Person-Years)		6525 (3.1)	6901 (3.3)	6522 (3.1)	15467 (7.4)	15289 (7.4)	50704

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	Human Response to Impact	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
72312401	THERMAL INJURY CRITERIA	Taylor	BBP	53122	03-OCT-83	30-JUN-94
72312403	BURN INJURY MODULE	Perry	BBP	53122	30-AUG-88	30-SEP-93
723124AA		Knox	BBP	53931	01-APR-90	30-SEP-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
723124--	4944.15	----	SUPPORT COSTS	HSD/6106MD
723124--	76558.02	----	SALARY COSTS	HSD/6106MD
72312401	2600.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72312401	11000.00	----	MIPR #FQ7624-90-00026 TO	HSD/7231
72312401	18500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/VIC
72312401	20500.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72312401	30000.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72312401	33000.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72312401	37377.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72312401	86311.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/VIC
723124AA	5000.00	----	TDY Reimbursement/JM0630	DNA/DNA
723124AA	49000.00	----	SALARY REIMBURSEMENT/JM06	DNA/DNA
723124AA	50000.00	----	MIPR to Army/JM0630 DNA M	DNA/DNA
FY 90 TOTAL	424,790.17			
723124--	5196.30	----	SUPPORT COSTS	HSD/6106MD
723124--	81454.63	----	SALARY COSTS	HSD/6106MD
72312401	19264.00	----	IMPACT PROTECTION UNDER P	HSD/7231
72312401	35335.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities	HSD/7231



DynCorp (formerly Dynalecton Corp)  
Operations and Maintenance of Impact Facilities  
DynCorp (formerly Dynalecton Corp)

HSD/7231

F33615-86-C-0531

60197.00

72312401

FY 91 TOTAL 201,446.93

HSD/6106MD  
HSD/6106MD  
HSD/7231  
HSD/7231

SUPPORT COSTS  
SALARY COSTS  
Engineering Support, Biodynamic Research  
Systems Research Laboratories, Inc  
Impact Research Facilities Operation & Maintenance  
DYNCORP-TEST & EVALUATION DIVISIONS

723124-- 5596.42  
723124-- 76123.42  
72312401 F33615-89-C-0574 50000.00  
72312401 F33615-91-C-0531 143000.00

FY 92 TOTAL 274,719.84

HSD/6106MD  
HSD/6106MD  
HSD/7231  
HSD/7231

SUPPORT COSTS  
SALARY COSTS  
Engineering Support, Biodynamic Research  
Systems Research Laboratories, Inc  
Impact Research Facilities Operation & Maintenance  
DYNCORP-TEST & EVALUATION DIVISIONS

723124-- 6150.46  
723124-- 203249.78  
72312401 F33615-89-C-0574 50000.00  
72312401 F33615-91-C-0531 143000.00

FY 93 TOTAL 402,400.24

HSJ/6106MD  
HSD/6106MD  
HSD/7231  
HSD/7231

SUPPORT COSTS  
SALARY COSTS  
Engineering Support, Biodynamic Research  
Systems Research Laboratories, Inc  
Impact Research Facilities Operation & Maintenance  
DYNCORP-TEST & EVALUATION DIVISIONS

723124-- 6882.37  
723124-- 206050.47  
72312401 F33615-89-C-0574 50000.00  
72312401 F33615-91-C-0531 143000.00

FY 94 TOTAL 405,932.84

5 YEAR TOTAL 1 709,290.02

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90072		ORAL PRESENTATION	Perry, C E knox, F S	Use of Burn Prediction Models to Assess Burn Hazard in Aerospace Research

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

DESCRIPTION OF TECHNOLOGY TRANSITIONED

CUSTOMERS

HSD/YAG, ASD/VSEE Burn Injury Assessment Criteria

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

DESCRIPTION OF TECHNOLOGY TRANSFERED

CUSTOMERS

NASA Impact Tolerance Criteria

Defense Nuclear Agency, Army Safety Center, Army Chemical School Burn Injury Assessment Criteria

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: IAF SON 322-79, PE 64706F/412A, ACES II Upgrade

CUSTOMERS: ASD/AES, CREST ADPO, AIF, C-17 SPO, NASP, DoD

MAJOR EQUIPMENT: Advanced Data Acquisition and Control System, Body Positioning and Restraint Device, Horizontal Decelerator, Impulse Accelerator, Deceleration Tower, Impact Machine, Thermal Test Facility

FACILITIES: Building 824

Aircrew Performance Enhancement in Sustained Acceleration

TASK MANAGER: William B Albery  
BBS - AV 785-5742

TASK NUMBER: 723125

OBJECTIVES:

1. To define the relationship between G protection and workload.
2. To define effects of complex mechanical stresses on crew performance.
3. To develop design aids to describe crew performance capability.
4. To develop spatial orientation concepts.

TASK TITLE: Aircrew Performance Enhancement in Sustained Acceleration

MIS CATEGORY: Core

MANAGER: Alberty OFFICE: BBS PHONE: 55742 START: 01-OCT-80 STOP: 01-JUL-96 PRIMARY PROGRAM ELEMENT: 62202F

\*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	67,196.00	.00	.00	.00	.00	67,196.00
On-Site Contract Costs	314,842.00	240,000.00	240,000.00	240,000.00	240,000.00	1,274,842.00
Civilian Salary Costs	195,387.50	174,807.10	225,509.30	281,044.31	329,289.77	1,206,037.98
Other Support Costs	16,570.69	17,451.70	18,673.57	20,244.18	22,314.30	95,254.44
Internal Funding Subtotal	593,996.19	432,258.80	484,182.87	541,288.49	591,604.07	2,643,330.42
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	15,000.00	65,195.00	.00	.00	.00	80,195.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	15,000.00	65,195.00	.00	.00	.00	80,195.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 608,996.19	\$ 497,453.80	\$ 484,182.87	\$ 541,288.49	\$ 591,604.07	\$ 2,723,525.42
In-house Labor Hours						
Alberty	954	645	874	998	1211	4682
Bolia	1104					1104
Brinkley	55	55	55	55	55	275
Chelette	906	490	928	948	1094	4366
Deer	990	187	395	811	811	3194
Esken	416	415	1301	1821	1821	5774
Frazier	962	948	1094	1136	1583	5723
Hutton	629					629
Leonard	536					536
McCloskey	1033	957	1165	1622	1739	6516
Popper	420	498	854	979	979	3310
Potor		458	458	458	458	2252
Raymond		772	1144	1560	1560	5036
Repperger	1914	830	1246	1870	1870	7730
Scarborough	190	324				514
Sexton		832	832	832	832	3328
Shriver	1294					2588
Skowronski	162					5112
Swinhart	830	1019	1206	1040	1685	3466
Swisher	1754	295	503	919	919	8613
Tripp	261	1387	1824	1824	1824	261
Total Hours (Person-Years)	14410 (6.9)	11406 (5.5)	13879 (6.7)	16873 (8.1)	18441 (8.9)	75009

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT WORKUNIT TITLE

WORKUNIT	WORKUNIT TITLE	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005B105	LASER DISSOCIATION OF O2				
72312501	Acceleration Performance				
72312502	Biodynamic Response/Accel				
72312505	Engineering, Tech. Support & Maint. of Dynamic Environ.				
72312511	Sim.				
72312512	DES Operation/Maintenance				
72312513	Controllers & Muscle Function				
72312513	DES O&M SUPPORT & ENGINEERING				
723125AD	ICES TEST REQUIREMENTS				
723125AE	COMBAT EDGE TESTS				
723125AF	COMBAT EDGE SUPP-SALARY				
723125AG	COMBAT EDGE SUPPORT R&D				
723125D1	Non-Intrusive Motion Activities				
723125D2	Spatial D Res on The Des				
723125D3	ENHANCE C TOL BY BITING				
723125XX	Engineering, Technical Support & Maintenance, DES				

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005B105	67196.00	F41622-90-C-1003	Prevention of Gravity Induced Loss of Consciousness Medical Laser Research & Development Cor	HSD/3005
723125--	12329.04	----	SUPPORT COSTS	HSD/6106MD
723125--	195387.50	----	SALARY COSTS	HSD/6106MD
72312501	84842.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/VIC
72312502	4241.65	----	Non-ADPE Maintenance -F/A	HSD/7231
72312505	15000.00	F33615-86-C-0546	Engineering, Technical Support & Maintenance, DES Raytheon Service Company	WRDC/WRDC
72312505	60000.00	F33615-86-C-0546	Engineering, Technical Support & Maintenance, DES Raytheon Service Company	HSD/7231
72312505	170000.00	F33615-86-C-0546	Engineering, Technical Support & Maintenance, DES Raytheon Service Company	HSD/7231

FY 90 TOTAL 608,996.19

723125--	12957.82	----	SUPPORT COSTS	HSD/6106MD
723125--	174807.10	----	SALARY COSTS	HSD/6106MD
72312502	4493.88	----	Non-ADPE Maintenance/F/A/M	HSD/7231
72312505	90000.00	F33615-86-C-0546	Engineering, Technical Support & Maintenance, DES Raytheon Service Company	HSD/7231

72312505	90000.00	F33615-86-C-0546	Engineering, Technical Support & Maintenance, DES Kaytheon Service Company	HSD/7231
72312513	60000.00	F33615-91-P-0001	Engineering, Technical Support & Maintenance, DES	HSD/7231
723125AF	4500.00	-----	JP9117 HSD/YA 91-17 SALAR	HSD/HSD/YAL
723125AG	6520.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/YAL/HSD/YAL
723125AG	58675.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/YAL/HSD/YAL
FY 91 TOTAL	501,953.80			

723125--	13955.57	-----	SUPPORT COSTS	HSD/6106MD
723125--	225509.30	-----	SALARY COSTS	HSD/6106MD
72312502	4718.00	-----	Maintenance Contract 1	HSD/7231
72312513	240000.00	F33615-91-P-0001	Engineering, Technical Support & Maintenance, DES	HSD/7231
FY 92 TOTAL	484,182.87			

723125--	15337.18	-----	SUPPORT COSTS	HSD/6106MD
723125--	281044.31	-----	SALARY COSTS	HSD/6106MD
72312502	4207.00	-----	Maintenance Contract 1	HSD/7231
72312513	240000.00	F33615-91-P-0001	Engineering, Technical Support & Maintenance, DES	HSD/7231
FY 93 TOTAL	541,288.49			

723125--	17162.30	-----	SUPPORT COSTS	HSD/6106MD
723125--	329289.77	-----	SALARY COSTS	HSD/6106MD
72312502	5152.00	-----	Maintenance Contract 1	HSD/7231
72312513	240000.00	F33615-91-P-0001	Engineering, Technical Support & Maintenance, DES	HSD/7231
FY 94 TOTAL	591,604.07			

5 YEAR TOTAL 2,728,025.42

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90036		ABSTRACT	Skowronski, V D Karl, A A Isken, R I Bolia, S D	A Motion Activated Articulating Seat (MAAS) - A Dynamic Concept for Cockpit Seat Design in High Perf
90231		ORAL PRESENTATION	Popper, S E Repperger, D W Frazier, J W Goodyear, C	Changes in Time Estimating Abilities Through Workload Analysis as Measured by +Gz Acceleration
90118		ABSTRACT	Popper, S E Repperger, D W Frazier, J W Goodyear, C	Changes in Time Estimating Abilities Through Workload Analysis as Measured by Gz Acceleration
90119		ORAL PRESENTATION	Popper, S E Repperger, D W Frazier, J W Goodyear, C	Changes in Time Estimating Abilities Through Workload Analysis as Measured by Gz Acceleration
90347		ABSTRACT	Tripp, L D	Combat Edge: A Test Subject's Perspective
90230		ORAL PRESENTATION	Chelette, T L Tripp, L D Skowronski, V Goodyear, C D	Effects on G Tolerance White biting Down on a Mandibular Orthopedic Repositioning Appliance
90020		ABSTRACT	Darwood, J Repperger, D W Goodyear, C D	Mass Discrimination Under G Stress
90120		ABSTRACT	Chelette, T L Tripp, L Leonard, C Skowronski, V	Masseter EMG As a Measure of Bite Block Use Under Various Gz Levels
90121		PROCEEDINGS	Chelette, T L Tripp, L Leonard, C Skowronski, V	Masseter EMG As a Measure of Bite Block Use Under Various Gz Levels
90229		ORAL PRESENTATION	Chelette, T L Tripp, L D Skowronski, V Goodyear, C D	Masseter EMG as a Measure of Bite Block Use Under Various Gz Levels
90071		ORAL PRESENTATION	Repperger, D W Remis, S J Merrill, G	Performance Measures of Teleoperation Using an Exoskeleton Device
90294		ABSTRACT	McCloskey, K	Subjective Reports Concerning Assisted Positive Pressure

# Breathing Under High Sustained Acceleration

Tripp, L  
Repperger, D W  
Popper, S

## OTHER - POSTER SESSION

90296

Subjective Responses to Assisted Positive Pressure Breathing (APPB) as a Means of High-G Protection

McCloskey, K  
Tripp, L  
Repperger, D  
Popper, S

## ORAL PRESENTATION

90297

Subjective Responses to Assisted Positive Pressure Breathing (APPB) as a Means of High-G Protection

McCloskey, K  
Tripp, L  
Repperger, D  
Popper, S

## ABSTRACT

90029

Time Estimating Ability During Gz Stress

Frazier, J  
Repperger, D  
Goodyear, C  
Popper, S

## ABSTRACT

90194

Time and Mass Perception in Non-Terrestrial Environments

Albery, W B  
Repperger, D W

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

## CUSTOMERS

## DESCRIPTION OF TECHNOLOGY TRANSITIONED

HSD/YA

Nonintrusive Motion Activated Cockpit Seat

HSD/YA

MORA Bite Block for Enhancing G Tolerance

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: AFTI F-16 TPP, AMD R-P9024(1)62345F, TAF SON 3-22-79, TAF SON 3-02-80, PE 62491/63249f, IAF SON 322-79, SAC SON 07-79M91, 13-81 GOR 06-78 (ADCOM), JMENS Contingency Launch System, etc.

CUSTOMERS: ASD/AES, HSD/YA (CREST ADPO), ASD/XR, AFM/FI, USN/NADC, AFSC DH 2-2, WG-11, WP-61, MSC/SCPA, etc.

MAJOR EQUIPMENT: SEI-32 Computer, Evans & Sutherland Picture System, Dynamic Environment Simulator (DES)

FACILITIES: Building 33



Crew Protection for Advanced Escape Systems

TASK MANAGER: Lawrence J Specker  
BBP - AV 785-3122

TASK NUMBER: 723131

OBJECTIVES:

1. To develop and experimentally evaluate design criteria for personnel restraint and automatic body positioning devices used in crew escape systems.
2. To define and evaluate impact attenuation systems for crew escape modules.
3. To define and evaluate the feasibility of crew escape from hypervelocity flight vehicles.

BACKGROUND:

This task supports the requirements of TAF SON 322-79 and the CREST program that will extend ejection seat performance envelope limits to 700 KEAS. The technical evaluation and research efforts under this task are primarily conducted in-house using our impact research facilities. Additional work is conducted through contract efforts and at wind tunnel, windblast and high speed test track facilities.

# AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 723131

TASK TITLE: Crew Protection for Advanced Escape Systems

MIS CATEGORY: Thrust

MANAGER: Specker

OFFICE: BBP

PHONE: 53122

START: 15-JAN-77

STOP: 31-DEC-96

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED		FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding							
Off-Site Contract Costs		.00	165,442.00	265,000.00	265,000.00	265,000.00	960,442.00
On-Site Contract Costs		312,644.00	743,535.00	173,000.00	173,000.00	173,000.00	1,575,179.00
Civilian Salary Costs		169,045.52	189,050.49	158,204.23	61,678.65	67,542.87	645,521.76
Other Support Costs		41,086.42	62,920.83	46,506.83	51,111.01	57,193.22	258,818.31
Internal Funding Subtotal		522,775.94	1,160,948.32	642,711.06	550,789.66	562,736.09	3,439,961.07
External Funding							
Off-Site Contract Costs		.00	75,000.00	.00	.00	.00	75,000.00
On-Site Contract Costs		.00	52,693.04	.00	.00	.00	52,693.04
Civilian Salary Costs		7,600.00	3,100.00	.00	.00	.00	10,700.00
Other Support Costs		.00	.00	.00	.00	.00	.00
External funding Subtotal		7,600.00	130,793.04	.00	.00	.00	138,393.04
Unfunded Requirements	(	.00)	.00)	.00)	.00)	.00)	.00)
Total Annual Costs	\$	530,375.94	\$ 1,291,741.36	\$ 642,711.06	\$ 550,789.66	\$ 562,736.09	\$ 3,578,354.11
In-House Labor Hours							
Atbery		86	104				190
Blake		38	38				114
Briggs	(MILITARY)	232	232	38			696
Brinkley		218	218	218	55	55	764
Buhrman		642	770	728	21	21	2182
Chelette		68	126				194
Esklen		568	520				1088
Frazier		60	62				122
Gutschow	(MILITARY)	729	292				1021
Gordon	(MILITARY)	308	28	728	832	832	3428
Hutton	(MILITARY)	173					173
Kno	(MILITARY)	421	399				1278
Lashley	(MILITARY)	728	936	458	208	208	3016
Maldonado	(MILITARY)	244	936	936	104	104	2324
McCloskey		66	208				274
Perry		1156	1231	645	208	208	3448
Plaga		1011	1358	1529	1165	1368	6431
Presnell	(MILITARY)	1200					1200
Raymond	(MILITARY)		208				208
Scarborough	(MILITARY)		416				687
Shriver	(MILITARY)	50	50				100
Skowronski	(MILITARY)	6	42				48
Smith		302	1349		1291	1310	302
Specker		1349	815	1349			6648
Strzelecki		938	208	732			2485
Swinhart	(MILITARY)	47					255

Swisher	(MILITARY)	70	208						278
Fallarovic	(MILITARY)	1838	1838						3676
Taylor	(MILITARY)	586	586						1758
Toler		1346	1346				586		4038
Tong	(MILITARY)		416				1346		832
Fucker	(MILITARY)	427					416		427
-----									
Total Hours (Person-Years)		15178 (7.3)	15640 (7.5)	10877 (5.2)	3884 (1.9)	4106 (2.0)			49685
=====									

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
72313101	Criteria for Escape Prot	Perry	BBP	53122	30-SEP-80	30-SEP-92
72313104	Design Criteria for Aircrew Windblast Protection	Specker	BBP	53122	17-APR-80	31-DEC-95
72313109	Impact Research Facilities Operation and Maintenance	Perry	BBP	53122	01-AUG-85	01-NOV-90
72313110	HYPERSONIC CREW ESCAPE	Specker	BBP	53122	17-JUL-87	31-DEC-96
72313112	LABORATORY SUPPORT IMPACT	Lashley	BB	53122	09-MAY-91	09-MAY-95
72313115	CREW ESCAPE HYPERVELOCITY FLIGHT	Specker	BBP	53122	01-OCT-90	30-SEP-94
723131AG	REPOSITIONING SEAT TESTS	Specker	BBP	53122	01-JUL-88	30-SEP-92
723131AJ	1-NIGHT'S SAFETY	Brinkley	BB	53602	05-JAN-90	30-DEC-90
723131AK	ATF EJECTION SEAT ANALYSIS	Specker	BBP	53122	15-JUN-90	30-SEP-90
723131AL	LAP BELT 40G IMPACT TESTS	Strzelecki	BBP	53122	15-JUL-90	30-SEP-90
723131AM	HBU-12/A LAP BELT TESTS	Strzelecki	BBP	53122	01-JAN-91	30-SEP-91
723131AP	HELMET-MOUNTED SYSTEM TECHNOLOGY SUPPORT	Lurker	BB	53602	20-MAY-91	30-DEC-91
723131AQ	NVG WINDBLAST TESTING	Specker	BBP	53122	01-MAY-91	30-DEC-91
723131AR	HMST SUPPORT	Perry	BBP	53122	01-JUN-91	30-SEP-91
723131AS	HYPERVELOCITY ESCAPE	Specker	BBP	53122	04-JUN-91	30-SEP-91
723131XX	O&M Impact Research Facilities	Perry	BBP	53122	01-OCT-90	31-JAN-91

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
723131--	558.00	----	TRAVEL EXPENSES	HSD/6106MD
723131--	40528.42	----	SUPPORT COSTS	HSD/6106MD
723131--	169045.52	----	SALARY COSTS	HSD/6106MD
72313104	25923.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313104	26000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/VIC
72313104	48100.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313109	2717.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynatecton Corp)	HSD/7231
72313109	10000.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynatecton Corp)	HSD/6106MD

72313109	10694.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	13542.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/VIC
72313109	16500.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	20500.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	33656.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	34612.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313110	50950.00	-----	F33657-86-C-2127	HSD/7231
72313110	80000.00	-----	F33657-86-C-2127, P00048/	HSD/7231
72313112	32000.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
723131AJ	38400.00	F33615-85-C-0530	Biodynamic Engineering Support Systems Research Laboratories, Inc.	HSD/VIC
723131AK	45000.00	-----	JP1404 ASD-0-1404	ASD/ASD
723131AL	3100.00	-----	JP07C2	SA-ALC/SA-ALC
FY 90 TOTAL	661,325.94			

723131--	586.46	-----	TRAVEL EXPENSES	HSD/6106MD
723131--	42595.37	-----	SUPPORT COSTS	HSD/6106MD
723131--	189050.49	-----	SALARY COSTS	HSD/6106MD
72313101	381.00	-----	AAMRLB9100089	HSD/7231
72313101	2385.00	-----	Supplies/Equipment/AAMRLB	HSD/7231
72313101	2537.00	-----	Other	HSD/7231
72313101	3036.00	-----	Desk Top III Contract F01	HSD/7231
72313101	11400.00	-----	Lap Top PC with 4MB Ram	HSD/7231
72313101	144760.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HSD/YA
72313104	1997.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231

72313104	3000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313104	11752.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HMST
72313104	27000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313104	80976.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313109	2.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	1619.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	8229.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	10000.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	10000.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	15000.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	18755.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	20000.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313109	22582.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/CREST
72313109	37418.00	F33615-91-P-0006	Crew Escape-Hypervelocity Flight	HSD/HSD
72313109	46016.00	F33615-86-C-0531	Operations and Maintenance of Impact Facilities DynCorp (formerly Dynalecton Corp)	HSD/7231
72313112	847.00	F33615-91-C-0531	Impact Research Facilities Operation & Maintenance DYNCORP-TEST & EVALUATION DIVISIONS	HSD/7231
72313112	88000.00	F33615-91-C-0531	Impact Research Facilities Operation & Maintenance DYNCORP-TEST & EVALUATION DIVISIONS	HSD/HSD/YA
72313112	106000.00	F33615-91-C-0531	Impact Research Facilities Operation & Maintenance DYNCORP-TEST & EVALUATION DIVISIONS	HSD/HSD/YA
72313112	127000.00	F33615-91-C-0531	Impact Research Facilities Operation & Maintenance DYNCORP-TEST & EVALUATION DIVISIONS	HSD/HSD/YA
72313115	84024.00	F33615-91-P-0006	Crew Escape-Hypervelocity Flight	HSD/7231

723131AG	22699.04	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	INDUS/INDUS
723131AG	29994.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	INDUS/INDUS
723131AM	3100.00	-----	JP07C2 MMI-91-707C2 SALAR	KELLY AF/SAALC
723131AP	44000.00	F33615-91-P-0006	Crew Escape-Hypervelocity Flight	HSD/HSD
723131AQ	3750.00	-----	SALARY REIMBURSEMENT/JP91	HSD/HMST
723131AS	75000.00	F33615-91-P-0006	Crew Escape-Hypervelocity Flight	HSD/YA/HSD/YA
FY 91 TOTAL	1,295,491.36			
723131--	631.62	-----	TRAVEL EXPENSES	HSD/6106MD
723131--	45875.21	-----	SUPPORT COSTS	HSD/6106MD
723131--	158204.23	-----	SALARY COSTS	HSD/6106MD
72313104	30000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313112	143000.00	F33615-91-C-0531	Impact Research Facilities Operation & Maintenance DYNCORP-TEST & EVALUATION DIVISIONS	HSD/7231
72313115	265000.00	F33615-91-P-0006	Crew Escape-Hypervelocity Flight	HSD/7231
FY 92 TOTAL	642,711.06			
723131--	694.15	-----	TRAVEL EXPENSES	HSD/6106MD
723131--	50416.86	-----	SUPPORT COSTS	HSD/6106MD
723131--	61678.65	-----	SALARY COSTS	HSD/6106MD
72313104	30000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313112	143000.00	F33615-91-C-0531	Impact Research Facilities Operation & Maintenance DYNCORP-TEST & EVALUATION DIVISIONS	HSD/7231
72313115	265000.00	F33615-91-P-0006	Crew Escape-Hypervelocity Flight	HSD/7231
FY 93 TOTAL	550,789.66			
723131--	776.75	-----	TRAVEL EXPENSES	HSD/6106MD
723131--	56416.47	-----	SUPPORT COSTS	HSD/6106MD

723131--	67542.87	-----	SALARY COSTS	HSD/6106MD
72313104	30000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313112	143000.00	F33615-91-C-0531	Impact Research Facilities Operation & Maintenance DYNCORP-TEST & EVALUATION DIVISIONS	HSD/7231
72313115	265000.00	F33615-91-P-0006	Crew Escape-Hypervelocity Flight	HSD/7231
FY 94 TOTAL	562,736.09			

5 YEAR TOTAL 3,713,054.11

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90061		ORAL PRESENTATION	Tucker, G R Brinkley, J W	Analysis of the F/FB-111 Ejection Experience and Proposed Crew Escape Module Design Changes
90190		PROCEEDINGS	Randall, C N Brinkley, J W	Impact on Women: A Retrospective Look at Impact Acceleration Testing at the Harry G. Armstrong Aero
90059		ABSTRACT	Brinkley, J W Perry, C E Determan, D A	Visually Coupled System II: Biodynamic Considerations
90257		ORAL PRESENTATION	Brinkley, J W Perry, C E Determan, D A	Visually Coupled System: Biodynamic Considerations

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

DESCRIPTION OF TECHNOLOGY TRANSITIONED

CUSTOMERS

ATF SPO, ASD/ENEC, NASP JPO

Acceleration Assessment Criteria

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

CUSTOMERS

DESCRIPTION OF TECHNOLOGY TRANSFERED

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
Rockwell International, North American Aircraft	Advanced Cockpit Integration	Brinkley
Rockwell International, North American Aircraft	Advanced Pilot Protection	Specker
Rockwell International, North American Aircraft	Advanced Pilot Protection	Brinkley
McDonnell Aircraft Company	Advanced Crew Station Design Concepts	Specker
Northrop Corporation, Aircraft Division	Advanced Fighter Crew Protection system (APS)	Specker

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: TAF SON 322-79, PE 64706F/412A, ACES II Upgrade

CUSTOMERS: CREST ADP, ASD/AES, NASP JPO, S-ALC, SA-ALC, F-16 SPO

MAJOR EQUIPMENT: Advanced Data Acquisition and Control System, Body Positioning and Restraint Device, Horizontal Decelerator, Impulse Accelerator, Deceleration Tower, Impact Machine

FACILITIES: Building 824



Voice Technology

TASK MANAGER: Thomas J. Moore  
BBS - AV 785-3607

TASK NUMBER: 723132

OBJECTIVES:

1. To investigate the performance of state-of-the-art speech recognition and speech synthesis/voice warning systems for use in high performance tactical attack and fighter aircraft.
2. To characterize the effects on the speech signal and its perception of environmental factors such as high ambient noise, vibration, acceleration, and other mechanical and emotional stressors.

## AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 723132

TASK TITLE: Voice Technology

MIS CATEGORY: Thrust

MANAGER: Moore

OFFICE: BBA

PHONE: 53607

START: 27-AUG-81

STOP: 11-SEP-90

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	72,033.00	.00	.00	.00	.00	72,033.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	8,960.35	.00	.00	.00	.00	8,960.35
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	80,993.35	.00	.00	.00	.00	80,993.35
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 80,993.35 \$	.00 \$	.00 \$	.00 \$	.00 \$	80,993.35
In-House Labor Hours						
Ericson	12					12
Moore	301					301
Watkins	5					5
Total Hours (Person-years)	318 (.2)	(.0)	(.0)	(.0)	(.0)	318

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
72313206	Speech Perception in Severe Environments	Moore	BBA	53607	01-FEB-86	11-SEP-90

## \*\*\*\*\* LIST OF ACTUAL AND PLANNED R&amp;D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
723132--	8960.35	----	SALARY COSTS	HSD/6106MD
72313206	72033.00	f33615-86-C-0549	Speech Recognition and Perception Indiana University Foundation	HSD/7231
FY 90 TOTAL	80,993.35			

5 YEAR TOTAL 80,993.35

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: PMD-R-P-2030(13)/64706f, SAC COR 205-78, MOA AFHRL-RADC-9-24-81, MOA NORAD, HQ USAF SON 4-81, RADC Project 5581, TAF/ROC 321-75

CUSTOMERS: FWC, ASD/EN, AFVAL/FI, EPA, USAF/SG, ASD AESO, OEHL, RADC, USN, NSA, AFII, Army, ESD/XR/IOET, Scientific Community

MAJOR EQUIPMENT: HP-9845, NEC DP-100, HP-9836, Speech Synthesis System, II Speech Recognition System, Symbolics 3670, Symbolics 3645

FACILITIES: Building 441

Audio Communications Countermeasures and Counter-Countermeasures

TASK MANAGER: Thomas J Moore  
BBA - AV 785-3607

TASK NUMBER: 723133

OBJECTIVES:

1. To provide the knowledge required to develop sustained, effective voice communications for mission fulfillment, even when an enemy is trying to disrupt those communications.
2. To develop and quantify the effectiveness of jamming modulations tailored to be effective against unfriendly voice communications.

BACKGROUND:

1. This task includes research on voice communications intelligence, talker discriminability, and multiple party communications with specific applications to tactical air and ground operations.
2. The task supports the specific requirements of IAF/ROC 321-75, Coronet Clear Report, IN-ESD-RADC-1702-76-43, AMD/AFFWC MOA-38, AFAMRL/RADC MOA-80-097, Joint Committee on Electronic Warfare (JCEW) Task Force letter to Director, EW and C3CM, Office of the Assistant Secretary of Defense.

TASK TITLE: Audio Communications Countermeasures and Counter-Countermeasures

MIS CATEGORY: Thrust

MANAGER: Moore OFFICE: BBA PHONE: 53607 START: 15-MAY-78 STOP: 30-SEP-92 PRIMARY PROGRAM ELEMENT: 62202F

\*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED		FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
<b>Internal Funding</b>							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		90,000.00	100,000.00	100,000.00	100,000.00	100,000.00	490,000.00
Civilian Salary Costs		30,114.60	40,627.00	38,225.11	.00	.00	112,966.71
Other Support Costs		.00	.00	.00	.00	.00	.00
<b>Internal funding Subtotal</b>		<b>120,114.60</b>	<b>140,627.00</b>	<b>138,225.11</b>	<b>100,000.00</b>	<b>100,000.00</b>	<b>602,966.71</b>
<b>External Funding</b>							
Off-Site Contract Costs		.00	.00	.00	.00	.00	.00
On-Site Contract Costs		315,005.00	150,000.00	.00	.00	.00	465,005.00
Civilian Salary Costs		.00	.00	.00	.00	.00	.00
Other Support Costs		.00	.00	.00	.00	.00	.00
<b>External funding Subtotal</b>		<b>315,005.00</b>	<b>150,000.00</b>	<b>.00</b>	<b>.00</b>	<b>.00</b>	<b>465,005.00</b>
<b>Unfunded Requirements</b>		<b>(.00)</b>	<b>(.00)</b>	<b>(.00)</b>	<b>(.00)</b>	<b>(.00)</b>	<b>(.00)</b>
<b>Total Annual Costs</b>	<b>\$</b>	<b>439,119.60</b>	<b>\$ 290,627.00</b>	<b>\$ 138,225.11</b>	<b>\$ 100,000.00</b>	<b>\$ 100,000.00</b>	<b>\$ 1,067,971.71</b>
<b>In-House Labor Hours</b>							
Alien		87	42	42			171
Anderson		12					12
Esken		222	208	208			738
Gillespie		457	202				659
McKinley		290	312	312			914
Moore		617	791	686			2094
Nixon		13	10	10			33
Watkins		59					59
<b>Total Hours (Person-Years)</b>		<b>1897 (1.9)</b>	<b>1565 (1.8)</b>	<b>1258 (1.6)</b>	<b>(.0)</b>	<b>(.0)</b>	<b>4720</b>

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
72313301	Intell & Discrim Cues	Moore	BBA	53607	15-MAY-78	30-SEP-92
72313302	MIL RADIO JAMMING TASK	McKinley	BBA	53607	01-DEC-89	30-SEP-90
72313303	JAMMING EFFECT MODEL	Moore	BBA	53607	01-FEB-90	30-DEC-90
72313304	VEHICULAR INTERCOM SYSTEM	Moore	BBA	53607	13-JUN-90	31-DEC-90
72313305	VIS ATTENUATION	Moore	BBA	53607	29-AUG-90	30-JAN-91
72313306	HAVE QUICK JAMMING TASKS	McKinley	BBA	53607	02-JAN-91	30-SEP-91

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
723133--	34114.60	-----	SALARY COSTS	HSD/6106MD
72313301	52500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	TAC/TAC
72313301	90000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
723133AP	147519.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFWC/KELLY AF
723133AQ	74986.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	JEWC/TAC/TAC
723133AR	25000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	ARMY/ARMY
723133AS	15000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	ARMY/ARMY
FY 90 TOTAL	439,119.60			
723133--	40627.00	-----	SALARY COSTS	HSD/6106MD
72313301	3065.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313301	10000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313301	39456.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313301	47479.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
723133AT	150000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	AFWC/KELLY
FY 91 TOTAL	290,627.00			
723133--	38225.11	-----	SALARY COSTS	HSD/6106MD
72313301	100000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 92 TOTAL	138,225.11			
72313301	100000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research	HSD/7231

Systems Research Laboratories, Inc

FY 93 TOTAL 100,000.00

72313301 100000.00 F33615-89-C-0574 Engineering Support, Biodynamic Research HSD/7231  
Systems Research Laboratories, Inc

FY 94 TOTAL 100,000.00

5 YEAR TOTAL 1,067,971.71

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IRAD TOPIC	EVALUATOR
GTE Laboratories	Human Speech Understanding	Moore

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: IAF ROC 321-75, RADC Project 5581, HQ USAF SON 4-81, MOA AFHRL-RADC 9-24-81, MOA AMRL-NORAD, PMD-R-P-2020(13)/64706f, SAC GOR 205-78

CUSTOMERS: AFEWC, JEWIC, ASD, ESD

MAJOR EQUIPMENT: Hewlett-Packard 9845 and 9836 Computers, Speech Synthesis System

FACILITIES: Building 441, Tempest facility

Exploratory Noise and Sonic Boom Research

TASK MANAGER: Jerry D Speakman  
BBE - AV 785-3605

TASK NUMBER: 723134

OBJECTIVES:

1. To provide the Air Force with technology essential to assess the impact of operational noise and sonic booms on communities around airbases, along Military Training Routes (MTR), and in Military Operating Areas (MOA).
2. To develop databases and software to predict noise exposure, provide psychoacoustic metrics, establish exposure criteria, and provide monitoring capabilities.

BACKGROUND:

1. This task provides direct support for USAF SON 1-81, Noise and Sonic Boom Description and Analysis. Adverse public reactions have created serious threats to aircraft bed-down, aircraft deployment, flight training, and other critical mission capabilities.
2. The Air Force must accomplish comprehensive environmental noise impact analyses in order to meet regulatory requirements, respond to congressional pressures, and defend itself in court. These analyses directly affect major management decisions involving aircraft development, flight/ground operations, noise suppressor requirements, facility siting, and land utilization/zoning issues.
3. Some products developed under this effort transition into the Noise and Sonic Boom Impact Technology (NSBIT) advanced development program, and others transition directly to MAJCOMs, AFESC, Navy, and other established users.



TASK TITLE: Exploratory Noise and Sonic Boom Research

MIS CATEGORY: Thrust

MANAGER: Speakman

OFFICE: BBE

PHONE: 53605

START: 25-JAN-83

STOP: 30-SEP-97

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	190,000.00	168,000.00	154,537.00	370,000.00	375,000.00	1,257,537.00
On-Site Contract Costs	233,000.00	272,000.00	197,000.00	.00	.00	702,000.00
Civilian Salary Costs	177,453.65	185,608.86	175,165.74	166,588.61	171,586.27	876,403.13
Other Support Costs	9,240.32	13,611.58	15,009.37	16,272.84	17,879.73	72,013.84
Internal Funding Subtotal	609,693.97	639,220.44	541,712.11	552,861.45	564,466.00	2,907,953.97
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	634,631.00	.00	.00	.00	.00	634,631.00
Civilian Salary Costs	48,000.00	.00	.00	.00	.00	48,000.00
Other Support Costs	10,178.00	2,202.00	.00	.00	.00	12,380.00
External Funding Subtotal	692,809.00	2,202.00	.00	.00	.00	695,011.00
Unfunded Requirements	( .00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 1,302,502.97	\$ 641,422.44	\$ 541,712.11	\$ 552,861.45	\$ 564,466.00	\$ 3,602,964.97
In-House Labor Hours						
Brennaman	193	333	352	333	333	1544
Brinkley	18	18	1046	1021	1021	36
Downing	1005	1046	1125	1125	1125	5139
Harris	1284	1125	352	333	333	5784
Heflin	2	333	468	1143	1143	1353
Hille	1012	936	1145	1143	1143	2416
Lee	1413	1144	1186	1186	1186	5988
Lundberg	1627	1186	1456	1400	1400	6371
McKinley	1372	1456	814	856	856	7084
Speakman	626	878				4030
Total Hours (Person-Years)	8552 (4.1)	8455 (4.1)	7944 (3.8)	7397 (3.6)	7397 (3.6)	39745

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
72313407	Community Noise Effects	Harris	BBE	53664	25-JAN-83	30-JUN-94
72313408	Noise-Boom Measurement/Monitor Research	Lee	BBE	53664	01-JAN-85	30-SEP-94
72313410	O&M Services in Support of Noise Research	Speakman	BBE	53605	15-JUN-86	15-SEP-92
72313411	Environmental Noise Research	Speakman	BBE	53605	20-JUL-89	20-JUL-92
72313412	Noise-Boom Forecast Research	Speakman	BBE	53605	01-MAR-85	30-SEP-94
72313413	BIO-DYN ENVIRONMENT RSCH	Lee	BBE	53664	01-JAN-91	30-SEP-95
72313414	O&M NOISE RESEARCH	Speakman	BBE	53605	01-OCT-91	30-SEP-97
72313415	WIND EFFECT ON A/C NOISE	Lundberg	BBE	53664	11-SEP-89	30-SEP-92
723134AC	O&M SUPPORT-NESBIT	Speakman	BBE	53605	18-FEB-87	31-DEC-91
723134AE	O&M SUPPORT-NSBIT	Cole	BBE	53675	01-NOV-87	30-SEP-91

723134AF FY-89 NSBIT SUPPORT Cole  
 723134AG FY 91 NOISE AND SONIC BOOM IMPACT TECHNOLOGY SUPPORT Speakman  
 723134AK ATF NOISE MEASUREMENTS Lee  
 723134AL NOISEMAP TECHNICAL REPORT Downing  
 723134AM ROUTEMAP VALIDATION Speakman

BBE 53675 01-NOV-88 30-SEP-91  
 BBE 53605 01-OCT-89 30-SEP-94  
 BBE 53664 01-MAR-90 30-SEP-91  
 BBE 53664 01-MAY-90 30-SEP-91  
 BBE 53605 30-JUL-90 01-JAN-91

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
723134--	698.00	----	TRAVEL EXPENSES	HSD/6106MD
723134--	8542.32	----	SUPPORT COSTS	HSD/6106MD
723134--	177453.65	----	SALARY COSTS	HSD/6106MD
72313410	46000.00	F33615-87-C-0535	Operation, Maintenance, & Engineering Support for Noise Research University of Dayton Research Institute	HSD/7231
72313410	48000.00	F33615-87-C-0535	Operation, Maintenance, & Engineering Support for Noise Research University of Dayton Research Institute	HSD/6106MD
72313410	139000.00	F33615-87-C-0535	Operation, Maintenance, & Engineering Support for Noise Research University of Dayton Research Institute	HSD/7231
72313411	190000.00	F33615-89-C-0531	Environmental Noise Research Wyle Laboratories	HSD/7231
723134AB	48000.00	----	SALARY REIMBURSEMENT JP90	HSD/YA/NSBIT
723134AK	10178.00	----	JP1196 ASD-0-1196	ASD/ASD
723134AM	634631.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	TAC/TAC

FY 90 TOTAL 1,302,502.97

723134--	733.60	----	TRAVEL EXPENSES	HSD/6106MD
723134--	8977.98	----	SUPPORT COSTS	HSD/6106MD
723134--	185608.86	----	SALARY COSTS	HSD/6106MD
72313408	2000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313408	18000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313408	65000.00	F33615-87-C-0535	Operation, Maintenance, & Engineering Support for Noise Research University of Dayton Research Institute	HSD/6106MD
72313410	93500.00	F33615-87-C-0535	Operation, Maintenance, & Engineering Support for Noise Research University of Dayton Research Institute	HSD/7231

University of Dayton Research Institute

Operation, Maintenance, & Engineering Support for Noise Research  
University of Dayton Research Institute

HSD/7231

F33615-87-C-0535

93500.00

72313410

Environmental Noise Research  
Wyle Laboratories

HSD/7231

F33615-89-C-0531

84000.00

72313411

Environmental Noise Research  
Wyle Laboratories

HSD/7231

F33615-89-C-0531

84000.00

72313411

ADPE MAINTENANCE/AAMRLC-9

HSD/7231

-----

3900.00

72313412

TDY Reimbursement/JP9172

ARMY/ARMY

-----

2202.00

723134AL

641,422.44

FY 91 TOTAL

TRAVEL EXPENSES

HSD/6106MD

-----

790.09

723134--

SUPPORT COSTS

HSD/6106MD

-----

9669.28

723134--

SALARY COSTS

HSD/6106MD

-----

175898.18

723134--

Maintenance Contract 1

HSD/7231

-----

4550.00

72313408

Operation, Maintenance, & Engineering Support for Noise Research  
University of Dayton Research Institute

HSD/7231

F33615-87-C-0535

197000.00

72313410

Environmental Noise Research  
Wyle Laboratories

HSD/7231

F33615-89-C-0531

56537.00

72313411

Biodynamic Environment Research

HSD/7231

F33615-92-P-0002

98000.00

72313413

542,444.55

FY 92 TOTAL

TRAVEL EXPENSES

HSD/6106MD

-----

868.30

723134--

SUPPORT COSTS

HSD/6106MD

-----

10626.54

723134--

SALARY COSTS

HSD/6106MD

-----

166588.61

723134--

Maintenance Contract 1

HSD/7231

-----

4778.00

72313408

Biodynamic Environment Research

HSD/7231

F33615-92-P-0002

170000.00

72313413

Operations, Maintenance & Engineering Support for Noise Research

HSD/7231

F33615-92-P-0001

200000.00

72313414

552,861.45

FY 93 TOTAL

TRAVEL EXPENSES

HSD/6106MD

-----

971.63

723134--

723134--	11891.10	-----	SUPPORT COSTS	HSD/6106MD
723134--	171586.27	-----	SALARY COSTS	HSD/6106MD
72313408	5017.00	-----	Maintenance Contract 2	HSD/7231
72313413	175000.00	F33615-92-P-0002	Biodynamic Environment Research	HSD/7231
72313414	200000.00	F33615-92-P-0001	Operations, Maintenance & Engineering Support for Noise Research	HSD/7231
FY 94 TOTAL	564,466.00			

5 YEAR TOTAL 3,603,697.41

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90147		ABSTRACT	Lee, R A	(U) Noisemap 6.0 - The USAF Microcomputer Program for Airport Noise Analysis
90230	A223069	TECHNICAL REPORT	Lee, R A Mohiman, H T	Air Force Procedure for Predicting Aircraft Noise Around Airbases: Airbase Operations Program (BASE)
90282	A223162	TECHNICAL REPORT	Moulton, C E	Air Force Procedure for Predicting Aircraft Noise Around Airbases: Noise Exposure Model (NOISEMAP 6)
90281	A223161	TECHNICAL REPORT	Lee, R A	BASEOPS Default Profiles for Civil Aircraft
90201	A218048	TECHNICAL REPORT	Lee, R A Crabill, M Masurek, D Palmer, B	Boom Event Analyzer Recorder (BEAR): System Description
90204	A218040	TECHNICAL REPORT	Harris, C S	Effects of Military Training Route Noise on Human Annoyance
90310		ORAL PRESENTATION	Harris, C S	Effects of Military Training Route Noise on Human Annoyance
90205	A218041	TECHNICAL REPORT	Speakman, J D	Lateral Attenuation of Military Aircraft Flight Noise

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

CUSTOMERS

DESCRIPTION OF TECHNOLOGY TRANSITIONED

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

## COMPANY

## IRAD TOPIC

## EVALUATOR

Allied Signal/Garrett Engine & Auxiliary Power Div Noise Suppression Research

Speakman

Lockheed Aeronautical Systems Company

Exterior Noise Prediction, Detection & Suppression

Speakman

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: USAF SON 1-81, HSD 62202F, HSD 4093/63723F, HSD AFESC AGREEMENT, HQ USAF AND SAC GENERIC ENVIRONMENTAL IMPACT STATEMENT ON MILITARY TRAINING ROUTES

CUSTOMERS: HQ USAF/CEVP, NSBIT, AFESC, HQ IAC, HQ SAC, NAVY, NASA, NATO, Other MAJCOMs

MAJOR EQUIPMENT: Spectral Analyzer, HP/PE Computer, Acoustic Data Acquisition Systems, Sonic Boom Event Recorders, NOISEBANK, Mobile Lab, Dynamic Pressure Chamber, Microphone Calibration System, VAX 3300 Computer

FACILITIES: Building 441, Building 824

Advanced Acceleration Protection Systems

TASK MANAGER: William B Albery  
BBS - AV 785-5742

TASK NUMBER: 723135

OBJECTIVE:

1. To extend combat maneuvering capability.
2. To evaluate developmental cockpit systems for final crew station equipment effectiveness.
3. To define and develop consciousness monitoring equipment.

# AMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 723135

TASK TITLE: Advanced Acceleration Protection Systems

MIS CATEGORY: Thrust

MANAGER: Albery

OFFICE: BBS

PHONE: 55742

START: 15-JUN-84

STOP: 30-SEP-93

PRIMARY PROGRAM ELEMENT: 62202F

## SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	240,000.00	240,000.00	240,000.00	720,000.00
On-Site Contract Costs	230,000.00	315,000.00	.00	.00	.00	545,000.00
Civilian Salary Costs	72,616.50	37,693.03	31,596.70	45,426.43	1,755.46	189,088.12
Other Support Costs	1,123.74	1,181.05	1,271.99	1,397.92	1,564.27	6,538.97
Internal Funding Subtotal	303,740.24	353,874.08	272,868.69	286,824.35	241,519.73	1,460,627.09
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	.00	.00	.00	.00	.00	.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Actual Costs	\$ 303,740.24	\$ 353,874.08	\$ 272,868.69	\$ 286,824.35	\$ 241,519.73	\$ 1,460,627.09
In-house Labor Hours						
Albery	354	212	212	212	212	990
Brinkley	41	41	37	37	37	156
Chappelle	144	146	146	146	146	582
Esken	2					2
Frazier	322	322	322	447		1413
Greene	42					42
Hutton	673					673
McCloskey	364	117	117	117		715
Popper	134	125	104	104		259
Potor	196	208	416			529
Raymond	428					624
Scarborough		146	146	146	146	428
Sexton	418	418	229	645		584
Skowronski	1517	229	208	457		836
Swinhart		208			457	2620
Tripp	16					1330
Total Hours (Person-Years)	4651 (2.2)	2297 (1.1)	1937 (.9)	2311 (1.1)	603 (.3)	11799

\*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
72313501	Adv Accel Prot Concepts	Albery	BBS	55742	15-JUN-84	30-DEC-92
72313502	Using LBNP to Increase -Gz Acceleration Tolerance	Tripp	BBS	55492	01-SEP-85	30-SEP-90
72313501	Development of a Multiple Sensor Arterial Pulse Monitor	Scarborough	BBS	54096	01-OCT-86	31-DEC-89

723135D2 G-Induced Loss of Consciousness & Prophylaxis  
 723135D4 Laser Doppler Flowmetry  
 723135D5 PAOS Anti-G Suit (LDF)  
 723135D6 Time Course and Physiology

Albery  
 Frazier  
 Poppe  
 Poppe

55742  
 52639  
 55492  
 55492

BBS  
 BBS  
 BBS  
 BBS

01-OCT-86  
 25-SEP-87  
 01-JAN-87  
 31-AUG-87

30-SEP-93  
 30-SEP-90  
 30-SEP-91  
 31-MAR-91

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
723135--	236.64	----	SUPPORT COSTS	HSD/6106MD
723135--	887.10	----	TRAVEL EXPENSES	HSD/6106MD
723135--	72616.50	----	SALARY COSTS	HSD/6106MD
72313501	60000.00	F33615-86-C-0546	Engineering, Technical Support & Maintenance, DES Raytheon Service Company	HSD/7231
72313501	170000.00	F33615-86-C-0546	Engineering, Technical Support & Maintenance, DES Raytheon Service Company	HSD/7231

FY 90 TOTAL 303,740.24

723135--	248.71	----	SUPPORT COSTS	HSD/6106MD
723135--	932.34	----	TRAVEL EXPENSES	HSL/6106MD
723135--	3769.03	----	SALARY COSTS	HSD/6106MD
72313501	7500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313501	60000.00	F33615-91-P-0001	Engineering, Technical Support & Maintenance, DES	HSD/7231
72313501	67500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313501	90000.00	F33615-86-C-0546	Engineering, Technical Support & Maintenance, DES Raytheon Service Company	HSD/7231
72313501	90000.00	F33615-86-C-0546	Engineering, Technical Support & Maintenance, DES Raytheon Service Company	HSD/7231

FY 91 TOTAL 353,874.08

723135--	267.86	----	SUPPORT COSTS	HSD/6106MD
723135--	1004.13	----	TRAVEL EXPENSES	HSD/6106MD
723135--	31596.70	----	SALARY COSTS	HSD/6106MD



72313501	240000.00	F33615-91-P-0003	Biodynamic Model	Interactive Data Base Support & Development	HSD/7231
FY 92 TOTAL	272,868.69				
723135--	294.38	----	SUPPORT COSTS		HSD/6106MD
723135--	1103.54	----	TRAVEL EXPENSES		HSD/6106MD
723135--	45426.43	----	SALARY COSTS		HSD/6106MD
72313501	240000.00	F33615-91-P-0003	Biodynamic Model	Interactive Data Base Support & Development	HSD/7231
FY 93 TOTAL	286,824.35				
723135--	329.41	----	SUPPORT COSTS		HSD/6106MD
723135--	1234.86	----	TRAVEL EXPENSES		HSD/6106MD
723135--	1755.46	----	SALARY COSTS		HSD/6106MD
72313501	240000.00	F33615-91-P-0003	Biodynamic Model	Interactive Data Base Support & Development	HSD/7231
FY 94 TOTAL	243,319.73				

5 YEAR TOTAL 1,460,627.09

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90228		ORAL PRESENTATION	Tripp, L D Chelette, T	Cerebral Blood Flow During +Gs Acceleration as Measured by Transcranial Doppler
90177		PROCEEDINGS	Albery, W B	Current Status of An Artificial Intelligence-Based Loss of Consciousness Monitoring System for Advan
90178		ORAL PRESENTATION	Albery, W B	Current Status of An Artificial Intelligence-Based Loss of Consciousness Monitoring System for Advan
90183		ABSTRACT	Tripp, L	Progressive Arterial Occlusion Anti-G Suit
90236		ORAL PRESENTATION	Albery, W B Repperger, D W	Simulating High G in the Dynamic Environment Simulator

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

CUSTOMERS

AFSC/NAX, HSD/XA

HSD/YAL

AFTI F-16 ADPO, HSD/YA

HSD/XA, USAFSAM/VN

DESCRIPTION OF TECHNOLOGY TRANSITIONED

Using Lower Body Negative Pressure (LBNP) to Increase Gz Acceleration Tolerance - Research, Prototype

Development of a Retrograde Inflation Anti-G Suit - Prototype

Advanced Acceleration Protection Concepts (Technical Paper)

Spatial Disorientation Research on the DES (Technical Report)

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY

Rockwell International, North American Aircraft

General Dynamics, Fort Worth Division

Advanced Cockpit Integration

Advanced Cockpits Control and Display Technologies

IRAD TOPIC

EVALUATOR

Frazier

Albery

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: IAF SON 302-80, Improved Anti-G Protection for Tactical Fighter Aircrews

CUSTOMERS: ASD/AES, IAC, ASD/XR, HSD 6.3 Tactical Life Support System (TLSS), AFVAL/FII (AFTI F-16 ADPO)

MAJOR EQUIPMENT: Dynamic Environment Simulator (DES)

FACILITIES: Building 33

Advanced Manikin Development

TASK MANAGER: Roy R Rasmussen  
BBM - AV 785-3665

TASK NUMBER: 723136

OBJECTIVES:

1. To design and develop an Advanced Dynamic Anthropomorphic Manikin (ADAM) for use in research and testing of manned aircraft subsystems, particularly ejection systems.
2. To establish a manikin testing and calibration facility at AAMRL.

BACKGROUND:

ADAM will be used in research and in the qualification and evaluation testing of manned aircraft subsystems, particularly ejection systems. The program was initiated against an ASD/EN Technical Need (TN-ASD-AAMRL-AFWAL/FI-0607-80-70) and is currently being driven by the CREST Advanced Development Program Office which requires an advanced ejection system test manikin for its technology demonstration program. Phase I of the ADAM program provides for the design and fabrication of two prototype manikins, the testing of these for compliance to performance specifications, and the preparation of engineering specifications adequate for future competitive procurement. Phase II of ADAM will provide for the manufacture of eight manikins for CREST program testing and two manikins for ASD/AES. Key technical emphasis in this program is on increased Z, X and Y axis body dynamic biofidelity; extensive manikin instrumentation, data acquisition and on-board data storage; telemetry; and sufficient durability to withstand ejection into a windstream of up to 700 KEAS (knots Equivalent Air Speed).

AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91  
 TASK TITLE: Advanced Manikin Development  
 TASK NUMBER: 723136  
 MIS CATEGORY: Thrust

MANAGER: Rasmussen OFFICE: BBM PHONE: 53665 START: 01-JAN-84 STOP: 31-DEC-92 PRIMARY PROGRAM ELEMENT: 62202F  
 \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	413,010.00	418,325.41	.00	.00	.00	831,335.41
On-Site Contract Costs	87,823.00	173,000.00	115,000.00	130,000.00	130,000.00	635,823.00
Civilian Salary Costs	26,910.90	52,232.37	56,224.13	.00	.00	135,367.40
Other Support Costs	3,651.00	3,837.20	7,815.67	8,547.80	9,389.27	33,240.94
Internal Funding Subtotal	531,394.90	647,394.98	179,039.80	138,547.80	139,389.27	1,635,766.75
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	27,351.00	.00	.00	.00	27,351.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	8,500.00	.00	.00	.00	.00	8,500.00
External Funding Subtotal	8,500.00	27,351.00	.00	.00	.00	35,851.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 539,894.90	\$ 674,745.98	\$ 179,039.80	\$ 138,547.80	\$ 139,389.27	\$ 1,671,617.75
In-House Labor Hours						
Coleman (MILITARY)	28	208	208			416
Beterman (MILITARY)			1084			28
Eveland	158	936	158			2020
Kaleps	86	158	549			474
Kline	921	549	1247			1184
Rasmussen	1188	1247	1188			3415
Spittie	512	1188				3564
Taylor						512
Total Hours (Person-years)	2893 (1.4)	4286 (2.1)	4434 (2.1)	(.0)	(.0)	11613

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
3005B109	ADAM INJURY ASSESSMENT	Rasmussen	BBM	53665	21-MAR-91	15-DEC-92
3005B205	COMPOSITE MANIKIN	Spittie	BBM	55963	28-AUG-90	31-DEC-92
72313601	Advanced Manikin (ADAM)	Rasmussen	BBM	53665	01-JAN-84	30-SEP-92
72313602	Advanced Manikin Development Program	Rasmussen	BBM	53665	01-JAN-84	30-MAR-92
72313607	Dev Of An Improved Neck For Ejection Sys test Manikins	Taylor	BBM	55963	01-JUL-87	09-JUL-90
72313608	MANIKIN COMPOSITIS	Taylor	BBM	55963	27-APR-88	19-JUL-90
72313610	Atb Biodynamic Modeling	Obergefell	BBM	55963	27-APR-88	14-JUN-90
72313611	COMPOSITE MANIKIN SEGMENT	Spittie	BBM	55963	18-AUG-89	30-NOV-91
72313612	COMPOSITE MANIKIN	Spittie	BBM	55963	28-AUG-90	31-DEC-92
72313613	COMPOSITE MANIKIN	Spittie	BBM	55963	28-AUG-90	31-DEC-92
723136AQ	LOJ Rollover Tests	Rasmussen	BBM	53665	06-AUG-87	30-OCT-90
723136AV	INO MANIKIN TEST NUMBER 1	Rasmussen	BBM	53665	10-JUL-89	30-SEP-90

723136AX TNO MANIKIN TESTING  
723136XX Composite Manikin Structure

Rasmussen BBM 53665 28-MAR-91 15-DEC-92  
Kaleps BBM 53665 01-OCT-89 30-SEP-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005B205	150000.00	F33615-90-P-0017	Advanced Biofidelic Composite Manikin SPARTA, Inc.	HSD/3005
723136--	3651.00	----	SUPPORT COSTS	HSD/6106MD
723136--	26910.90	----	SALARY COSTS	HSD/6106MD
72313601	42823.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313601	45000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313602	6469.00	F33615-85-C-0535	Advanced Manikin Development Program System Research Laboratories, Inc.	HSD/CREST
72313602	10000.00	F33615-85-C-0535	Advanced Manikin Development Program System Research Laboratories, Inc.	HSD/CREST
72313602	10541.00	F33615-85-C-0535	Advanced Manikin Development Program System Research Laboratories, Inc.	HSD/CREST
72313602	36000.00	F33615-85-C-0535	Advanced Manikin Development Program System Research Laboratories, Inc.	HSD/CREST
72313611	200000.00	F33615-89-C-0570	Composite Manikin Segments to Improve Kinematic Response Simula, Inc	HSD/3005
723136AV	8500.00	----	JM931C Check-Netherlands	DUTCH/DUTCH
FY 90 TOTAL	539,894.90			

3005B109	67169.41	F41624-91-P-0009	Adapting the ADAM Manikin Tech for Injury Probability Assessment Biodynamic Research Corporation	HSD/3005
3005B205	150000.00	F33615-90-P-0017	Advanced Biofidelic Composite Manikin SPARTA, Inc.	HSD/3005
723136--	3837.20	----	SUPPORT COSTS	HSD/6106MD
723136--	52232.37	----	SALARY COSTS	HSD/6106MD
72313601	581.20	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/CREST
72313601	2918.80	F33615-89-C-0574	Engineering Support, Biodynamic Research	HSD/CREST

72313601	10500.00	F33615-89-C-0574	Systems Research Laboratories, Inc	HSD/7231
72313601	21035.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313601	23000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/HSD/YA
72313601	31500.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/CREST
72313601	38465.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313601	45000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313603	40000.00	F33615-85-C-0535	Advanced Manikin Development Program System Research Laboratories, Inc.	HSD/CREST
72313611	161156.00	F33615-89-C-0570	Composite Manikin Segments to Improve Kinematic Response Simula, Inc	HSD/3005
723136AG	65000.00	-----	P.O. HSD/YA-91-08 (JM9108)	HSD/NSBIT
723136AX	4100.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DUTCH/DUTCH
723136AX	23251.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	DUTCH/DUTCH
FY 91 TOTAL	739,745.98			
723136--	4132.67	-----	SUPPORT COSTS	HSD/6106MD
723136--	56224.13	-----	SALARY COSTS	HSD/6106MD
72313601	3683.00	-----	Maintenance Contracts 2	HSD/7231
72313601	115000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 92 TOTAL	179,039.80			
723136--	4541.80	-----	SUPPORT COSTS	HSD/6106MD
72313601	4006.00	-----	Maintenance Contract 2	HSD/7231
72313601	130000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231

FY 93 TOTAL 138,547.80

723136--	5082.27	-----	SUPPORT COSTS	HSD/6106MD
72313601	4307.00	-----	Maintenance Contract 2	HSD/7231
72313601	130000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 94 TOTAL	139,389.27			

5 YEAR TOTAL 1,736,617.75

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90051		DRAFT TP	Albery, C B Whitestone, J J Lephart, A	Automated Mass Properties Measurement System Calibration Procedures

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

CUSTOMERS

DESCRIPTION OF TECHNOLOGY TRANSITIONED

HSD/YA-CREST

ADAM

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: DG TW-4/1, DG TW-5/1, DG TW-6/1, AFFDL Technology Plan, MOA ASD-CREST-HSD, MOA NADC-AAMRL (HSD 321)

CUSTOMERS: ASD/AES, CREST

MAJOR EQUIPMENT: 8 Crash Testing Dummies, 2 ADAM Prototypes, Inertial Property Measurement System, Head/Neck Impact Pendulum, 3-D Digitizer

FACILITIES: Building 441, Building 824 (Manikin Testing Laboratory)



Robotic Telepresence

TASK MANAGER: Ronald G Julian  
BBA - AV 785-4244

TASK NUMBER: 723138

OBJECTIVE:

1. Investigate "human-in-the-loop" control of telepresence systems. Identify feedback modality and mechanisms. Develop and implement control algorithms for manipulation.
2. Validate component technology concepts via laboratory experimentation.
3. Define metrics for human control/robotic feedback. Determine critical values for key metrics.
4. Develop telepresence technology data base.

BACKGROUND:

Specific applications now being addressed are:

1. Fine and coarse manipulation by human control - Involves kinematics, dynamic control, and proprioceptive feedback.
2. Tactile stimulation with the associated tactile sensing - Array size determination, human physiology of tactile mechanisms.

# AAMRL TECHNICAL MANAGEMENT SUMMARY: 28-JUN-91

TASK NUMBER: 723138

TASK TITLE: Robotic Telepresence

MIS CATEGORY: Thrust

MANAGER: Julian OFFICE: BBA PHONE: 54244

START: 01-APR-84 STOP: 01-FEB-96

PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	555,197.00	316,657.00	.00	.00	.00	871,854.00
On-Site Contract Costs	65,700.00	101,000.00	110,000.00	110,000.00	110,000.00	496,700.00
Civilian Salary Costs	5,408.45	2,442.53	2,678.57	3,381.52	3,482.97	17,394.04
Other Support Costs	5,000.00	19,000.00	10,000.00	10,000.00	10,000.00	54,000.00
Internal Funding Subtotal	631,305.45	439,099.53	122,678.57	123,381.52	123,482.97	1,439,948.04
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	.00	.00	.00	.00	.00	.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	900.00	.00	.00	.00	.00	900.00
External Funding Subtotal	900.00	.00	.00	.00	.00	900.00
Unfunded Requirements	(.00) (	.00) (	.00) (	.00) (	.00) (	.00) (
Total Annual Costs	\$ 632,205.45	\$ 439,099.53	\$ 122,678.57	\$ 123,381.52	\$ 123,482.97	\$ 1,440,848.04

### In-House Labor Hours

Anderson	115	21	25	1800	1800	115
Brinkley	21	500	1800	1800	1800	67
Hasser	(MILITARY)	437	437			5900
Julian	(MILITARY)	1699	1699	1699	1699	1339
Nelson	(MILITARY)	42	42	83	83	7057
Nixon	(MILITARY)	1598	241			289
Remis	(MILITARY)	1303	1080			1839
Watkins	(MILITARY)	3865 (1.9)	4020 (1.9)	4207 (2.0)	3582 (1.7)	63
Wright	(MILITARY)	3865 (1.9)	4020 (1.9)	4207 (2.0)	3582 (1.7)	2587
Total Hours (Person-Years)						19256

### \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
3005B102	EXPERT SYSTEM FOR FORCE REFLTN	Remis	BBA	53671	10-SEP-89	30-MAR-90
3005B103	TELEOPERATOR CONTROL GLOV	Wright	BBA	53671	14-AUG-89	25-APR-90
3005B104	CUTANEOUS TACTILE SENSING	Wright	BBA	53671	14-AUG-89	20-APR-90
3005B106	STAD ROBOT TASK BATTERY	Julian	BBA	54244	20-JUL-90	20-FEB-91
3005B107	MASTER/SLAVE TOOLS	Wright	BBA	53671	04-SEP-90	04-APR-91
3005B110	HIGH PERFORMANCE MINIATURE JOINT DRIVER	Julian	BBA	54244	31-JUL-91	30-JUN-92
3005B204	CUTANEOUS TACTILE SYSTEM	Wright	BBA	53671	15-FEB-91	15-FEB-93
72313803	Telepresence	Julian	BBA	54244	07-APR-86	31-MAR-94
72313804	SMA FEEDBACK ACTUATOR	Julian	BBA	54244	25-APR-88	12-OCT-89
72313805	FORCE REFLECTION TECHNOLOGY	Remis	BBA	53671	27-APR-88	20-OCT-90
7313806	DUAL ROB ARM FORCE REFCIN	Jaster	BBA	53607	25-APR-88	01-NOV-89

72313807	DEVELOPMENT OF BILATERAL	Nelson	53671	16-JAN-90	17-FEB-92
72313808	HUMAN SENSORY FEEDBACK	Julian	54244	01-SEP-90	01-FEB-96
723138AB	UNMANNED AERIAL VEHICLE	Julian	54244	29-JUN-90	30-SEP-91
723138D1	Exoskeleton for Robotic Arm Control	Remis	53671	01-SEP-86	30-JUN-90
723138D2	Robot Dynamics & Feedback	Obergfell	55963	17-AUG-87	30-JUN-90
723138D3	Controller For Dex Hand	Repperger	55742	01-SEP-87	31-JAN-91
723138D4	NEURAL NETWORKS FOR ADAPTIVE CONTROL OF ROBOTIC MANIPULATORS	Anderson	53607	01-NOV-88	30-SEP-91
723138D5	QUANTITATIVE HAND KINEMATICS	Wright	53671	01-DEC-88	31-DEC-91
723138T5	Robotics Travel Support	Zember	53603	5-SEP-86	30-SEP-92

\*\*\*\*\* LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK \*\*\*\*\*

WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)	FUND SOURCE
3005B106	49331.00	F41622-90-C-1006	Standardized Task Battery For Robotic System Performance Human Machine Interfaces, Inc	HSD/3005
3005B107	68866.00	F41622-90-C-1002	Telepresent Master/Slave Tools with Force and Tactile Feedback Begej Corporation	HSD/3005
3005B204	100000.00	F41624-91-C-6001	Anthropomorphic Cutaneous Tactile Sensing On Dexterous Mechanical Bonneville Scientific, Inc.	HSD/3005
723138--	5408.45	-----	SALARY COSTS	HSD/6106MD
72313803	353.00	-----	AF Form 616 HY-90-20 To A	HSD/7231
72313803	435.00	-----	HY-90-20 to AFIT/F3360090	HSD/7231
72313803	1218.00	-----	HY-90-20 F33600-90-F-1471	HSD/7231
72313803	2994.00	-----	HY-90-20 F3360090M5216	HSD/7231
72313803	65700.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313807	37000.00	F33615-89-C-0578	Exoskeleton Hand Controller Hardware Odetics, Inc	HSD/3005
72313807	300000.00	F33615-89-C-0578	Exoskeleton Hand Controller Hardware Odetics, Inc	HSD/3005
723138AB	900.00	-----	JM0164 NAVY MIPR N0042190	NAVY/NAVY

FY 90 TOTAL	632,205.45
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30058110	49966.00	F41624-91-P-0013	Design of a High-Performance Miniature Joint Driver Barrett Technology, Inc.	HSD/3005
30058204	150000.00	F41624-91-C-6001	Anthropomorphic Cutaneous Tactile Sensing On Dexterous Mechanical Bonneville Scientific, Inc.	HSD/3005
723138--	2442.53	-----	SALARY COSTS	HSD/6106MD

72313803	43.90	-----	AF 616 TO AFIT/HY 91-0011	HSD/7231
72313803	111.00	-----	AF 616 TO AFIT/HY 91-0011	HSD/7231
72313803	133.10	-----	AF616 TO AFIT/ENG #HY91-0	HSD/7231
72313803	4000.00	-----	AFLC 277 to DOE (ORNL)	
72313807	116691.00	F33615-89-C-0578	Exoskeleton Hand Controller Hardware Odetics, Inc	HSD/7231
72313808	1623.00	-----	Supplies/Equipment/AAMRL9	HSD/7231
72313808	3246.00	-----	AAMRL9100016/F01620-90-D-	HSD/7231
72313808	4712.00	-----	AF 616 to AFIT/ENG/HY 91-	HSD/7231
72313808	5131.00	-----	Computer Purchases, Desk	HSD/7231
72313808	9600.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313808	25027.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
72313808	66373.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 91 TOTAL	439,099.53			
723138--	2678.57	-----	SALARY COSTS	HSD/6106MD
72313808	10000.00	-----	AF 616 (AFIT)	HSD/7231
72313808	110000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 92 TOTAL	122,678.57			
723138--	3381.52	-----	SALARY COSTS	HSD/6106MD
72313808	10000.00	-----	AF 616 To AFIT	HSD/7231
72313808	110000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 93 TOTAL	123,381.52			
723138--	3482.97	-----	SALARY COSTS	HSD/6106MD

72313808	10000.00	-----	AF 616 To AFIT	HSD/7231
72313808	110000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc	HSD/7231
FY 94 TOTAL	123,482.97			

5 YEAR TOTAL 1,440,848.04

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

IDENT	DTIC NUMBER	PRODUCT TYPE	AUTHOR	PRODUCT TITLE
90232	PROCEEDINGS		Julian, R G	Considerations for the Operator-Robot Interface in Teleoperation
90233	ORAL PRESENTATION		Julian, R G	Considerations for the Operator-Robot Interface in Teleoperation
90258	PROCEEDINGS		Remis, S J	Design of an Exoskeleton with Kinesthetic Feedback: Lessons Learned
90259	ORAL PRESENTATION		Remis, S J	Design of an Exoskeleton with Kinesthetic Feedback: Lessons Learned
90225	ABSTRACT		Wright, A K	Empirical Measurement of Joint Torques at the Human Shoulder and Elbow to Establish Design Criteria
90260	PROCEEDINGS		Wright, A K Stanisic, M M	Kinematic Mappings Between the EXOS Handmaster Exoskeleton and the Utah/MIT Dextrous Hand
90261	ORAL PRESENTATION		Wright, A K Stanisic, M M	Kinematic Mappings Between the EXOS Handmaster Exoskeleton and the Utah/MIT Dextrous Hand

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

COMPANY	IR&D TOPIC	EVALUATOR
AAI Corporation 402332	Robotic Vehicle Operators	Wright
AAI Corporation 402332	Sensor Technology	Wright
Preing Aerospace & Electronics	Manipulative Robotic Systems	Julian

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: Project Forecast II: Robotics Telepresence, Super Cockpit - HSD/XR:R/T Utility Study - NATO: RSG-18

CUSTOMERS:

MAJOR EQUIPMENT: Mobile Robotics Testbed, Dexterous Manipulators, Robotic Arms, Exoskeleton, Tactile Stimulator

FACILITIES: Building 441

Digital Audio Technology for Aircraft

TASK MANAGER: Richard L McKinley  
BBA - AV 785-3607

TASK NUMBER: 723139

OBJECTIVES:

To provide a natural, robust auditory interface and auditory displays to operators to allow effective communications in sophisticated future weapons systems. State-of-the-art technologies will be developed and integrated into a bioengineered, homogenous aircraft audio system under the specific objectives that follow.

1. To provide an integrated and interactive three dimensional (azimuth, elevation, and distance), auditory display environment for the aircraft member via 3-dimensional auditory localization cue synthesis methodology and hardware.
2. To develop a high fidelity, high performance, digital, tempest qualified, audio system for aircraft.
3. To integrate voice control/speech recognition and voice feedback into aircraft avionics systems.
4. To develop advanced active noise reduction technology applied to aircrew communications and hearing protection systems.

BACKGROUND:

Continued growth in weapon systems capability requires advanced audio technology to enhance crewmember and weapon systems effectiveness. Systems such as ATF, ATA and V-22 are target platforms for such technologies.

Digital Audio Technology integrates such state-of-the-art systems as 3-D auditory displays, active noise reduction, speech recognition/control/synthesis, digital speech communication, enhancement/noise reduction, high speed fiber optic audio bus, and advanced noise cancelling array microphones. The digital audio technology system will supply crewmembers significantly enhanced auditory perceptual capabilities that will provide distinct advantages in ensuring mission success.

## TASK TITLE: Digital Audio Technology for Aircraft

MIS CATEGORY: Thrust

MANAGER: McKinley OFFICE: BBA PHONE: 53607 START: 23-DEC-87 STOP: 31-DEC-93 PRIMARY PROGRAM ELEMENT: 62202F

## \*\*\*\*\* SUMMARY OF RESOURCES (ACTUAL COMMITMENTS FOR PREVIOUS FISCAL YEAR, PLANNED FOR OTHER YEARS) \*\*\*\*\*

RESOURCES USED	FY 90	FY 91	FY 92	FY 93	FY 94	5-YEAR TOTAL
Internal Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	188,772.00	255,000.00	70,000.00	70,000.00	70,000.00	653,772.00
Civilian Salary Costs	59,109.55	96,720.33	98,398.57	175,173.20	126,388.69	555,790.34
Other Support Costs	.00	.00	.00	.00	.00	.00
Internal Funding Subtotal	247,881.55	351,720.33	168,398.57	245,173.20	196,388.69	1,209,562.34
External Funding						
Off-Site Contract Costs	.00	.00	.00	.00	.00	.00
On-Site Contract Costs	800,000.00	.00	.00	.00	.00	800,000.00
Civilian Salary Costs	.00	.00	.00	.00	.00	.00
Other Support Costs	.00	.00	.00	.00	.00	.00
External Funding Subtotal	800,000.00	.00	.00	.00	.00	800,000.00
Unfunded Requirements	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Total Annual Costs	\$ 1,047,881.55	\$ 351,720.33	\$ 168,398.57	\$ 245,173.20	\$ 196,388.69	\$ 2,009,562.34
In-House Labor Hours						
Allen (MILITARY)	39	39	39	1872	1872	117
Ericson	856	1456	1456			7512
Ericson	354					354
McKinley (MILITARY)	856	936	936	1872	1872	6472
Moore	225	312	312	728		1577
Nixon	49	58	58	27	12	204
Obert		728	312	1560		2600
Steuer	822	1064	1325	1533	1533	6277
Watkins	5					5
West (MILITARY)				1498		1498
Total Hours (Person-Years)	3206 (1.5)	4593 (2.2)	4438 (2.1)	9090 (4.4)	5289 (2.5)	26616

## \*\*\*\*\* WORKUNITS INCLUDED IN THIS TASK \*\*\*\*\*

WORKUNIT	WORKUNIT TITLE	MONITOR	BRANCH	PHONE	START DATE	STOP DATE
72313901	Sim Auditory Localization	Ericson	BBA	53607	23-DEC-87	30-SEP-92
72313902	Sim 3D Aud Local Feasibility	Ericson	BBA	53607	23-DEC-87	31-DEC-93
72313903	AUDIO WORLD	Steuer	BBA	54244	01-APR-88	01-APR-93
723139AA	3-D AUDIO DISPLAY	McKinley	BBA	53607	01-FEB-90	30-SEP-90
723139AB	INTEGRATED HELMET	Moore	BBA	53607	01-AUG-90	30-SEP-91
723139AC	Appl of 3-D Displays	McKinley	BBA	53607	03-JAN-91	30-SEP-92



***** LIST OF ACTUAL AND PLANNED R&D FUNDING ACTIONS FOR TASK *****					FUND SOURCE
WORKUNIT	COST	CONTRACT NUMBER	CONTRACT TITLE AND NAME OF CONTRACTOR (IF KNOWN)		
723139--	59109.55	----	SALARY COSTS		HSD/6106MD
72313903	54000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc		HSD/7231
723139AA	134772.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc		HSD/VIC
723139AB	800000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc		WRDC/WRDC
FY 90 TOTAL 1,047,881.55					
-----					
723139--	96720.33	----	SALARY COSTS		HSD/6106MD
72313901	63000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc		HSD/7231
72313903	7000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc		HSD/7231
723139AC	185000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc		HSD/HMST
FY 91 TOTAL 351,720.33					
-----					
723139--	98398.57	----	SALARY COSTS		HSD/6106MD
72313903	70000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc		HSD/7231
FY 92 TOTAL 168,398.57					
-----					
723139--	175173.20	----	SALARY COSTS		HSD/6106MD
72313903	70000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc		HSD/7231
FY 93 TOTAL 245,173.20					
-----					
723139--	126388.69	----	SALARY COSTS		HSD/6106MD
72313903	70000.00	F33615-89-C-0574	Engineering Support, Biodynamic Research Systems Research Laboratories, Inc		HSD/7231

FY 94 TOTAL 196,388.69

5 YEAR TOTAL 2,009,562.34

\*\*\*\*\* ENHANCEMENTS \*\*\*\*\*

\*\*\*\*\* PUBLICATIONS PRODUCED UNDER TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* PATENTS PENDING, PATENTS APPLIED AND INVENTION DISCLOSURES \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSITIONS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* TECHNOLOGY TRANSFERS FROM TASK DURING PREVIOUS YEAR \*\*\*\*\*

\*\*\*\*\* INDEPENDENT RESEARCH AND DEVELOPMENT (IRAD) EVALUATIONS \*\*\*\*\*

\*\*\*\*\* ADDITIONAL TASK INFORMATION \*\*\*\*\*

REQUIREMENTS SUPPORTED: MOA AMRE ASD/YW, TAF SON 307-81, TAF SON 302-81, TAF GOR 304-78

CUSTOMERS: AF, AFA, V-22, ASD, USN, USA, TAC

MAJOR EQUIPMENT: Three-Dimensional Auditory Localization Facility

FACILITIES: Building 441, Voice Communication Research & Eval System, Performance & Comm Research & Technology

## Future Year Plans for RDI&amp;E Funding 6.1 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
2312V118	Effects of AF Propellants & Chemicals on Metabolic Mechanism - ESS SUPPORT	-----	\$72 K	\$92 K	\$128 K	\$128 K	\$128 K	\$548 K
2312V1AA	Tracking of supply and equipment funds for task 2312V1 - ESS SUPPORT	-----	\$8 K					\$8 K
2312V1AA	Tracking of supply and equipment funds for task 2312V1 - ESS SUPPORT	-----	\$27 K			\$50 K	\$50 K	\$127 K
2312V1AB	Tracking of travel funds for task 2312V1 - ESS SUPPORT	-----	\$8 K	\$8 K	\$8 K	\$8 K	\$8 K	\$40 K
*****	SUBTOTALS FOR ***** 2312V1		\$116 K	\$100 K	\$136 K	\$186 K	\$186 K	\$724 K
2313V135	Electro-& Magneto-Encephalographic Indicants Of Cogn Funct - ESS SUPPORT	F33615-89-C-0532	\$164 K	\$175 K	\$155 K			\$494 K
2313V1TV	AFOSR Travel Fund Tracking for Task 2313V1 - ESS SUPPORT	-----	\$2 K	\$5 K	\$5 K			\$12 K
*****	SUBTOTALS FOR ***** 2313V1		\$166 K	\$180 K	\$160 K			\$506 K
2313V201	Basic Visual Perceptual Processes for Displays - ESS SUPPORT	F33615-89-C-0532	\$167 K	\$168 K	\$215 K			\$550 K
2313V2TV	AFOSR Travel Fund Tracking for Task 2313V2 - ESS SUPPORT	-----	\$3 K	\$2 K	\$5 K			\$10 K
*****	SUBTOTALS FOR ***** 2313V2		\$170 K	\$170 K	\$220 K			\$560 K
2313V301	Auditory Processing - ESS SUPPORT	-----	\$20 K	\$18 K	\$32 K			\$70 K
2313V301	Auditory Processing - ESS SUPPORT	-----		\$45 K				\$45 K
2313V301	Auditory Processing - ESS SUPPORT	-----	\$13 K	\$7 K	\$7 K			\$27 K
2313V301	Auditory Processing - ESS SUPPORT	F33615-85-C-0530	\$12 K					\$12 K
2313V301	Auditory Processing - ESS SUPPORT	F33615-89-C-0574	\$104 K	\$90 K	\$104 K			\$298 K

## Future Year Plans for RDT&amp;E Funding 6.1 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
2313V302	SPATIAL ORIENTATION - ESS SUPPORT	F33615-85-C-0530	\$8 K					\$8 K
2313V302	SPATIAL ORIENTATION - ESS SUPPORT	F33615-89-C-0574	\$76 K					\$76 K
***** SUBTOTALS FOR ***** 2313V3			\$233 K	\$160 K	\$143 K			\$536 K
2313V401	COGNITION IN DUAL-TASK - ESS SUPPORT	F33615-89-C-0532	\$133 K	\$69 K	\$65 K			\$266 K
2313V402	R and I-S Performance - ESS SUPPORT	F33615-89-C-0532		\$67 K	\$65 K			\$131 K
2313V4SP	SUPPORT FOR AFOSR - ESS SUPPORT	F33615-87-C-0531		\$3 K				\$3 K
2313V4TV	TRAVEL - ESS SUPPORT	----	\$2 K	\$2 K	\$6 K			\$10 K
***** SUBTOTALS FOR ***** 2313V4			\$135 K	\$140 K	\$135 K			\$410 K
***** GRAND TOTALS *****			\$820 K	\$750 K	\$794 K	\$186 K	\$186 K	\$2,736 K

## Future Year Plans for RDT&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
27290718	AF NBC Warfare Vul Anal	F33615-89-C-0533	\$1,059 K	\$1,110 K	\$1,450 K	\$1,480 K	\$1,480 K	\$6,579 K
2729071D	Task Travel Support - TDY	-----	\$15 K	\$20 K	\$20 K	\$20 K	\$20 K	\$95 K
7231208B	NERVE AGENT PROTECTION - ESS SUPPORT	F33615-89-C-0574		\$169 K				\$169 K
*****	SUBTOTALS FOR ***** 2729		\$1,074 K	\$1,299 K	\$1,470 K	\$1,500 K	\$1,500 K	\$6,843 K
63020001	Toxic Hazards Research - ESS SUPPORT	-----	\$18 K					\$18 K
63020001	Toxic Hazards Research - ESS SUPPORT	F33615-85-C-0532	\$4 K					\$4 K
630200TD	Project Travel Support - ESS SUPPORT	-----	\$31 K	\$40 K	\$40 K	\$40 K	\$40 K	\$191 K
630200TS	TH Support - ESS SUPPORT	-----	\$240 K	\$162 K				\$403 K
630200TS	TH Support - ESS SUPPORT	-----	\$18 K	\$31 K				\$49 K
630200TS	TH Support - ESS SUPPORT	-----	\$4 K	\$ K				\$4 K
630200TS	TH Support - ESS SUPPORT	-----		\$10 K				\$10 K
630200TS	TH Support - ESS SUPPORT	-----		\$671 K	\$174 K	\$174 K	\$174 K	\$1,193 K
630200TS	TH Support - ESS SUPPORT	F33615-81-C-0500		\$ K				\$ K
630200VS	Toxic Hazards Support for Veterinary Services - ESS SUPPORT	-----		\$272 K				\$272 K
630200VS	Toxic Hazards Support for Veterinary Services - ESS SUPPORT	F33615-85-C-0532	\$100 K					\$100 K
63020104	Toxicologic Screening of Toxic Chem & Mater Used in AF Oper - ESS SUPPORT	F33615-85-C-0532	\$166 K					\$166 K
63020104	Toxicologic Screening of Toxic Chem & Mater Used in AF Oper - ESS SUPPORT	F33615-90-C-0532			\$1,124 K			\$1,124 K

## Future Year Plans for RDI&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
63020158	Toxicology Of Aerospace Structural Composites - ESS SUPPORT	F33615-85-C-0532	\$50 K					\$50 K
63020169	Toxicology of New Hydraulic Fluid - ESS SUPPORT	F33615-85-C-0532	\$600 K					\$600 K
63020170	New Methods in Combustion Toxicology - ESS SUPPORT	F33615-85-C-0532	\$50 K					\$50 K
63020170	New Methods in Combustion Toxicology - ESS SUPPORT	F33615-90-C-0532			\$145 K	\$159 K	\$140 K	\$444 K
63020171	Toxicology of CTFE - ESS SUPPORT	F33615-90-C-0532		\$100 K				\$100 K
63020172	Toxicology of High Energy Propellants - ESS SUPPORT	F33615-85-C-0532	\$200 K					\$200 K
63020174	TOXIC SCREENING OF AIR FORCE CHEMICALS - ESS SUPPORT	F33615-85-C-0532		\$300 K				\$300 K
63020174	TOXIC SCREENING OF AIR FORCE CHEMICALS - ESS SUPPORT	F33615-90-C-0532		\$200 K				\$200 K
63020175	TOXICOLOGY OF HALON REPLACEMENTS - ESS SUPPORT	F33615-90-C-0532		\$100 K				\$100 K
630201CP	AAMRL CLIN Path Support - ESS SUPPORT		\$85 K					\$85 K
63020218	Analysis & Modeling Of Routes Of Absorption Of repr Compound - ESS SUPPORT	F33615-85-C-0532	\$100 K	\$100 K				\$200 K
63020218	Analysis & Modeling Of Routes Of Absorption Of repr Compound - ESS SUPPORT	F33615-90-C-0532		\$100 K	\$300 K	\$310 K	\$315 K	\$1,025 K
63020219	TEM and Permeability Changes Resulting from Dermal Exposure - ESS SUPPORT			\$4 K				\$4 K
63020219	TEM and Permeability Changes Resulting from Dermal Exposure - ESS SUPPORT	F33615-85-C-0532	\$150 K					\$150 K
63020220	Pharmacodynamics of Carcinogenesis - ESS SUPPORT	F33615-85-C-0532	\$250 K	\$200 K				\$450 K
63020220	Pharmacodynamics of Carcinogenesis - ESS SUPPORT	F33615-90-C-0532			\$145 K	\$155 K	\$140 K	\$440 K

ESS SUPPORT

63020222	Development of Strategy for Tiered Approach - ESS SUPPORT	F33615-85-C-0532	\$50 K	\$100 K	\$150 K
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## Future Year Plans for RDT&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
63020223	Development of Predictive Toxicological Techniques - ESS SUPPORT	-----	\$23 K					\$23 K
63020223	Development of Predictive Toxicological Techniques - ESS SUPPORT	F33615-85-C-0532		\$200 K				\$200 K
63020223	Development of Predictive Toxicological Techniques - ESS SUPPORT	F33615-90-C-0532			\$145 K	\$145 K	\$140 K	\$430 K
63020224	HEALTH EFFECTS TOOL DEVELOPMENT - ESS SUPPORT	F33615-90-C-0532		\$100 K				\$100 K
63021302	Toxicokinetic Modeling of Air Force IRP Chemicals - ESS SUPPORT	-----	\$9 K					\$9 K
63021302	Toxicokinetic Modeling of Air Force IRP Chemicals - ESS SUPPORT	F33615-90-C-0532			\$200 K	\$200 K	\$218 K	\$618 K
63021305	Absorption Routes - Installation Restoration Program C	F33615-90-C-0532		\$9 K				\$9 K
63021305	Absorption Routes - Installation Restoration Program C - ESS SUPPORT	F33615-90-C-0532		\$61 K				\$61 K
63021402	Dermal Hazards of Hydrazines - ESS SUPPORT	F33615-85-C-0532	\$200 K					\$200 K
63021406	BIOLOGICAL MONITORING EXPOSURE INDICES - ESS SUPPORT	-----		\$99 K				\$99 K
63021406	BIOLOGICAL MONITORING EXPOSURE INDICES - ESS SUPPORT	-----		\$3 K				\$3 K
*****	SUBTOTALS FOR ***** 6302		\$2,347 K	\$2,865 K	\$2,273 K	\$1,183 K	\$1,167 K	\$9,835 K
68930000	Project Fund Tracking - ESS SUPPORT	-----			\$10 K			\$10 K
68930010	Project Travel Support - ESS SUPPORT	-----	\$25 K	\$50 K	\$50 K	\$50 K	\$50 K	\$225 K
68930130	Optical Counter Measures Identification And Refinement	F33615-87-C-0531	\$248 K	\$159 K	\$170 K	\$145 K	\$140 K	\$862 K
68930130	Optical Counter Measures Identification And Refinement - ESS SUPPORT	F33615-89-C-0532	\$32 K					\$32 K
68930135	Optical Counter Measures Effectiveness	F33615-87-C-0531	\$70 K	\$100 K	\$88 K	\$71 K	\$61 K	\$390 K



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Estimate

## Future Year Plans for RDT&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
68930469	AIR DEF INTERACTIVE SIM	F33615-87-C-0531	\$109 K					\$109 K
68930469	AIR DEF INTERACTIVE SIM - ESS SUPPORT	F33615-89-C-0532		\$75 K				\$75 K
6893047A	68930467 Fund Tracking (Survivability Control) - ESS SUPPORT	-----	\$23 K					\$23 K
6893049A	SUPPORT FOR 68930469	F33615-87-C-0531	\$28 K	\$103 K	\$222 K		\$190 K	\$543 K
6893049A	SUPPORT FOR 68930469 - ESS SUPPORT	F33615-89-C-0532	\$93 K			\$196 K		\$289 K
68930601	Visual/Motion Cue Effects - ESS SUPPORT	F33615-89-C-0532	\$100 K	\$163 K	\$167 K	\$148 K	\$114 K	\$692 K
68930609	Integrated Control/Display Concepts For System Design - ESS SUPPORT	F33615-89-C-0532	\$ K					\$ K
68930613	CUES/Control in Flight - ESS SUPPORT	F33615-89-C-0574				\$110 K		\$110 K
68930613	CUES/Control in Flight - ESS SUPPORT	F33615-89-C-0532	\$141 K	\$100 K	\$125 K		\$100 K	\$466 K
68931102	Visual Perf Capability - ESS SUPPORT	F33615-89-C-0532	\$310 K	\$304 K	\$300 K	\$280 K	\$225 K	\$1,419 K
68931103	Space Systems Human Engineering Design Methodology - ESS SUPPORT	F33615-89-C-0532	\$35 K	\$66 K	\$42 K	\$80 K	\$80 K	\$303 K
6893113A	Motion Analysis Theory - ESS SUPPORT	-----	\$1 K					\$1 K
6893113A	Motion Analysis Theory	F33615-85-C-0531	\$54 K					\$54 K
6893113A	Motion Analysis Theory	F33615-89-C-0572		\$50 K	\$50 K	\$20 K	\$20 K	\$140 K
*****	SUBTOTALS FOR ***** 6803		\$1,270 K	\$1,170 K	\$1,224 K	\$1,100 K	\$980 K	\$5,744 K
71840008	Equipment Rental/Maintenance - ADPE MAINTENANCE	-----	\$310 K	\$342 K				\$652 K
71840008	Equipment Rental/Maintenance - SUPPLY/EQUIPMENT	-----		\$1 K				\$1 K

## Future Year Plans for ROT&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
71840008	Equipment Rental/Maintenance - LEASE/RENTAL OF HARDW	-----	\$4 K	\$ K				\$4 K
71840008	Equipment Rental/Maintenance - OTHER - Maintenance Contracts	-----			\$465 K	\$465 K	\$465 K	\$1,395 K
71840018	System Engineering Simulation Research	F33615-88-D-0536	\$178 K					\$178 K
71840018	System Engineering Simulation Research	F33615-88-D-0536		\$43 K				\$43 K
718400DD	Project Fund Tracking - ADPE MAINTENANCE	-----		\$3 K				\$3 K
718400DD	Project Fund Tracking - SUPPLY/EQUIPMENT	-----	\$11 K	\$24 K				\$34 K
718400DD	Project Fund Tracking - MIPR	-----		\$33 K				\$33 K
718400DD	Project Fund Tracking - AIR FORCE FORM 616	-----	\$6 K	\$30 K				\$36 K
718400DD	Project Fund Tracking - PROJECT ORDER	-----		\$46 K				\$46 K
718400DD	Project Fund Tracking - OTHER - Equipment Rental/Maintena	-----		\$51 K				\$51 K
718400DD	Project Fund Tracking	F33615-87-C-0534	\$4 K					\$4 K
718400TD	Project Travel Support - TDY	-----	\$76 K	\$109 K	\$100 K	\$100 K	\$100 K	\$485 K
71840831	Human Physical Capabilities for AF Jobs - ESS SUPPORT	F33615-89-C-0532	\$20 K					\$20 K
71840842	Analysis of Human SFF	F33615-85-C-0531	\$40 K					\$40 K
71840844	COMPUTER MDLS ERGONOMICS	F33615-89-C-0575	\$369 K	\$375 K	\$350 K	\$350 K	\$100 K	\$1,544 K
71840845	M-D Anthropometric A&F	F33615-89-C-0572	\$70 K	\$195 K	\$231 K	\$226 K		\$722 K
71840850	Engineering Morphometrics - ESS SUPPORT	F33615-89-C-0532		\$50 K	\$30 K	\$30 K	\$30 K	\$140 K

## Future Year Plans for RDT&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
7184085J	HUMAN BODY DATA ANALYSIS - ESS SUPPORT	F33615-87-C-0530	\$50 K					\$50 K
7184085K	STAT SHAPE SUMMARY-NVG - ESS SUPPORT	-----	\$24 K					\$24 K
7184085K	STAT SHAPE SUMMARY-NVG - ESS SUPPORT	-----	\$9 K					\$9 K
7184018D	Funding to be determined	F33615-89-C-0575				\$300 K	\$300 K	\$300 K
7184018D	Funding to be determined	F33615-89-C-0572				\$294 K	\$294 K	\$294 K
71841039	SACDEF	F33615-87-C-0531	\$25 K					\$25 K
71841044	ADVANCED STRATEGIC COCKPIT ENGINEERING - ESS SUPPORT	F33615-89-C-0532	\$328 K	\$295 K	\$410 K	\$500 K	\$360 K	\$1,893 K
71841045	Strat Crew Performance Enhancement	F33615-87-C-0531	\$210 K					\$210 K
71841045	Strat Crew Performance Enhancement - ESS SUPPORT	F33615-89-C-0532		\$69 K				\$69 K
71841046	Strat Information & force Management	F33615-87-C-0531	\$115 K					\$115 K
71841046	Strat Information & force Management - ESS SUPPORT	F33615-89-C-0532	\$95 K	\$95 K				\$190 K
7184104F	SUPPORT OF 71841045 - ESS SUPPORT	-----		\$40 K				\$40 K
7184104F	SUPPORT OF 71841045	F33615-87-C-0531		\$247 K	\$597 K	\$606 K	\$455 K	\$1,905 K
7184104F	SUPPORT OF 71841045	F33615-87-C-0531		\$95 K			\$130 K	\$225 K
7184104G	SUPPORT OF RAPID PROTO	F33615-91-P-0008		\$20 K	\$150 K	\$200 K		\$370 K
71841146	Advanced Visually Coupled System and Display Concepts - ESS SUPPORT	F33615-89-C-0532	\$909 K	\$549 K	\$493 K	\$611 K	\$579 K	\$3,141 K
71841149	Color Display Design Criteria - ESS SUPPORT	F33615-89-C-0532	\$106 K	\$85 K	\$85 K	\$485 K	\$300 K	\$1,061 K

## Future Year Plans for RDI&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
71841155	Miniature Color Display	F33615-91-C-0533			\$280 K	\$210 K		\$490 K
71841155	Miniature Color Display	F33615-91-C-0534		\$210 K				\$210 K
71841158	DESIGN EVALUATION OF VCS - ESS SUPPORT	F33615-89-C-0532	\$78 K	\$165 K	\$310 K		\$278 K	\$831 K
71841159	VAR TRANSMITTANCE VISOR	F33615-91-C-0533		\$92 K	\$80 K			\$172 K
71841159	VAR TRANSMITTANCE VISOR - ESS SUPPORT	F33615-89-C-0532	\$153 K					\$153 K
7184116F	VIRTUAL TACTILE DISPLAY SYSTEM	F33615-87-C-0534		\$54 K				\$54 K
71841221	DETECH Laboratory	F33615-87-C-0534	\$38 K					\$38 K
71841221	DETECH Laboratory - ESS SUPPORT	F33615-89-C-0532	\$240 K	\$191 K	\$280 K	\$285 K	\$295 K	\$1,290 K
71841222	CSERIAC - ESS SUPPORT	-----	\$10 K		\$157 K	\$100 K	\$100 K	\$367 K
71841224	CASHE - ESS SUPPORT	-----			\$60 K	\$166 K	\$250 K	\$476 K
7184122A	SUPPORT OF 71841221	F33615-87-C-0531		\$5 K				\$5 K
71841423	Advanced Performance Assessment of R&D	F33615-88-D-0532		\$40 K	\$50 K	\$50 K	\$43 K	\$183 K
71841425	Operator Metric Tech - ESS SUPPORT	F33615-89-C-0532	\$418 K	\$315 K	\$508 K	\$505 K	\$525 K	\$2,271 K
71841426	Real-Time Performance Measurement - ESS SUPPORT	F33615-89-C-0532	\$45 K	\$99 K	\$65 K	\$63 K	\$172 K	\$444 K
7184146A	Complex Performance - ESS SUPPORT	-----	\$40 K	\$50 K				\$90 K
7184146B	Inflight Performance Measures - ESS SUPPORT	-----	\$30 K	\$40 K				\$70 K
7184146G	AFOSR MINI-GRANT PROGRAM - ESS SUPPORT	-----		\$23 K				\$23 K

## Future Year Plans for RDT&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 CCST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
71841909	COGNITIVE ENGRG: VMMI	F33615-87-C-0534			\$123 K			\$123 K
71841909	COGNITIVE ENGRG: VMMI - ESS SUPPORT	F33615-89-C-0532	\$55 K	\$94 K		\$120 K	\$242 K	\$511 K
7184191B	COG C mplexity Metric Development	F33615-87-C-0534	\$67 K					\$67 K
71842601	Adv TAC Crew Station Intg - ESS SUPPORT	F33615-89-C-0574						
71842601	Adv TAC Crew Station Intg - ESS SUPPORT	F33615-89-C-0532	\$659 K	\$430 K	\$240 K	\$718 K	\$713 K	\$2,765 K
71842602	TAC Cont/Display Eval/MOD - ESS SUPPORT	F33615-89-C-0532		\$669 K	\$488 K	\$250 K	\$344 K	\$1,751 K
71842607	Automated Human Factors Data Base Management for Designers	F33615-86-C-0542	\$155 K	\$356 K	\$71 K			\$582 K
71842611	Pilot-Centric TASS Program	F33615-87-C-0534	\$139 K	\$35 K				\$174 K
7184261A	SUPPORT OF AIM-SIGHT	F33615-87-C-0531	\$137 K	\$70 K	\$290 K	\$290 K	\$290 K	\$1,077 K
7184261B	NYIT GRAPHICS	F33615-88-D-0532	\$32 K	\$71 K	\$257 K			\$360 K
7184261F	Computer Graphics for OCS - AIR FORCE FORM 616		\$15 K					\$15 K
7184261L	LOCALIZER SOFTWARE DEVELOPMENT - FSS	F33615-85-C-0530	\$2 K					\$2 K
7184261L	LOCALIZER SOFTWARE DEVELOPMENT - ESS	F33615-89-C-0574	\$15 K					\$15 K
7184261M	NIGHT FOV STUDY	F33615-88-D-0532	\$200 K					\$200 K
7184262F	SA METRICS SPECIFICATION	F33615-88-D-0532	\$18 K	\$2 K				\$20 K
****	SUBTOTALS FOR ***** 7184		\$5,502 K	\$5,800 K	\$6,170 K	\$6,330 K	\$6,370 K	\$30,172 K
72310002	Biodynamic Engineering Support - FSS	F33615-85-C-0530	\$53 K					\$53 K

## Future Year Plans for RDI&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
72310003	BIODYNAMIC ENGR SUPPORT - ESS SUPPORT	F33615-89-C-0574	\$43 K					\$43 K
72310100	To Be Determined - ESS SUPPORT	F33615-89-C-0574				\$190 K		\$190 K
72312012	Research Management Support - ESS SUPPORT	-----	\$93 K					\$93 K
72312012	Research Management Support - ESS SUPPORT	F33615-89-C-0574	\$125 K	\$122 K	\$303 K	\$338 K		\$888 K
72312014	ROLLOVER CRASH DYNAMICS - ESS SUPPORT	F33615-89-C-0574	\$22 K	\$6 K				\$28 K
72312014	Project Travel Support - ESS SUPPORT	-----	\$4 K	\$5 K				\$9 K
72312014	Project Travel Support - ESS SUPPORT	-----	\$54 K	\$59 K	\$69 K	\$14 K	\$79 K	\$335 K
72312014	Test Wing Support - ESS SUPPORT	-----		\$19 K				\$19 K
72312014	Voice Comm Analysis & Evaluation - ESS SUPPORT	-----	\$72 K	\$2 K				\$73 K
72312014	Voice Comm Analysis & Evaluation - ESS SUPPORT	F33615-89-C-0574	\$207 K					\$207 K
72312014	Bioacoustics and Biocommunications - ESS SUPPORT	-----		\$45 K				\$45 K
72312014	Bioacoustics and Biocommunications - ESS SUPPORT	-----			\$58 K	\$59 K	\$62 K	\$180 K
72312014	Bioacoustics and Biocommunications - ESS SUPPORT	F33615-89-C-0574		\$292 K	\$357 K	\$314 K	\$320 K	\$1,284 K
72312018	Bioacoustic Research Subjects - ESS SUPPORT	F33615-89-C-0574	\$90 K					\$90 K
72312203	Biomaterials/Kinematics - ESS SUPPORT	-----	\$3 K	\$9 K				\$11 K
72312203	Biomaterials/Kinematics - ESS SUPPORT	-----		\$2 K				\$2 K
72312203	Biomaterials/Kinematics - ESS SUPPORT	-----						\$ K

## Future Programs for RDI&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
2231203	Biomechanics Experiments - ESS SUPPORT	F33615-89-C-0574	\$39 K	\$2 K				\$41 K
22312301	Impact Response Models - ESS SUPPORT			\$54 K				\$54 K
22312301	Impact Response Models - ESS SUPPORT			\$28 K				\$75 K
22312301	Impact Response Models - ESS SUPPORT				\$3 K	\$22 K	\$23 K	\$47 K
22312301	Impact Response Models - ESS SUPPORT	F33615-89-C-0574	\$54 K	\$101 K	\$194 K	\$213 K	\$215 K	\$777 K
22312301	Impact Response Models - ESS SUPPORT	F33615-91-C-0531		\$48 K				\$48 K
22312301	Impact Response Models - ESS SUPPORT							
22312301	Impact Response Models - ESS SUPPORT	F33615-87-C-0530	\$33 K					\$33 K
22312301	Impact Response Models - ESS SUPPORT	F33615-87-C-0530	\$7 K					\$7 K
22312301	Impact Response Models - ESS SUPPORT		\$11 K					\$11 K
22312301	Impact Response Models - ESS SUPPORT			\$19 K				\$19 K
22312301	Impact Response Models - ESS SUPPORT	F33615-86-C-0531	\$86 K	\$96 K				\$182 K
22312301	Impact Response Models - ESS SUPPORT	F33615-89-C-0574	\$37 K		\$50 K	\$50 K	\$50 K	\$187 K
22312301	Impact Response Models - ESS SUPPORT	F33615-91-C-0531			\$143 K	\$143 K	\$143 K	\$429 K
22312301	Impact Response Models - ESS SUPPORT		\$4 K	\$4 K				\$9 K
22312301	Impact Response Models - ESS SUPPORT				\$5 K	\$5 K	\$5 K	\$15 K
22312301	Impact Response Models - ESS SUPPORT	F33615-86-C-0576	\$230 K	\$180 K				\$410 K
22312301	Impact Response Models - ESS SUPPORT							
22312301	Impact Response Models - ESS SUPPORT	F33615-91-P-0001			\$240 K	\$240 K	\$240 K	\$720 K



## Future Year Plans for RDI&amp;I funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
22313013	O&M SUPPORT & ENGINEERING - ESS SUPPORT	F33615-91-P-0001		\$60 K				\$60 K
22313101	Criteria for Escape Prot - ESS SUPPORT			\$3 K				\$3 K
22313101	Criteria for Escape Prot - ESS SUPPORT			\$17 K				\$17 K
22313106	Design Criteria for Aircrew Windblast Protection - ESS SUPPORT	F33615-89-C-0574	\$74 K	\$113 K	\$30 K	\$30 K	\$30 K	\$277 K
22313109	Impact Research Facilities Operation and Maintenance - ESS SUPPORT	F33615-86-C-0531		\$15 K				\$15 K
22313109	Impact Research Facilities Operation and Maintenance - ESS SUPPORT	F33615-86-C-0531	\$119 K	\$115 K				\$233 K
22313110	HYPERSONIC CREW ESCAPE - ESS SUPPORT		\$131 K					\$131 K
22313112	LABORATORY SUPPORT IMPACT - ESS SUPPORT	F33615-86-C-0531	\$32 K					\$32 K
22313112	LABORATORY SUPPORT IMPACT - ESS SUPPORT	F33615-91-C-0531		\$1 K	\$143 K	\$143 K	\$143 K	\$430 K
22313115	CREW ESCAPE HYPERVELOCITY FLIGHT	F33615-91-P-0006			\$265 K	\$265 K	\$265 K	\$795 K
22313115	CREW ESCAPE HYPERVELOCITY FLIGHT	F33615-91-P-0006		\$84 K				\$84 K
22313206	Speech Perception in Severe Environments	F33615-86-C-0549	\$72 K					\$72 K
22313301	Intell & Discrim Cues - ESS SUPPORT	F33615-89-C-0574	\$90 K	\$100 K	\$100 K	\$100 K	\$100 K	\$490 K
22313408	Noise-Boom Measurement/Monitor Research - ESS SUPPORT				\$5 K	\$5 K	\$5 K	\$14 K
22313408	Noise-Boom Measurement/Monitor Research - ESS SUPPORT	F33615-89-C-0574		\$20 K				\$20 K
22313410	O&M Services in Support of Noise Research - ESS SUPPORT	F33615-87-C-0535	\$185 K	\$187 K	\$197 K			\$569 K
22313411	Environmental Noise Research	F33615-89-C-0531	\$190 K	\$168 K	\$57 K			\$415 K

## Future Year Plans for RDI&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
22313412	Noise-Room Forecast Research - ADPE MAINTENANCE	-----		\$4 K				\$4 K
22313413	BIODIN ENVIRONMENT RSCH	F33615-92-P-0002			\$98 K	\$170 K	\$175 K	\$443 K
22313414	O&M NOISE RESEARCH	F33615-92-P-0001				\$200 K	\$200 K	\$400 K
22313401	Adv Accep Prot Concepts - FSS SUPPORT	F33615-86-C-0546	\$230 K	\$180 K				\$410 K
22313401	Adv Accep Prot Concepts - FSS SUPPORT	F33615-89-C-0574		\$75 K				\$75 K
22313401	Adv Accep Prot Concepts	F33615-91-P-0003			\$240 K	\$240 K	\$240 K	\$720 K
22313401	Adv Accep Prot Concepts - FSS SUPPORT	F33615-91-P-0001		\$60 K				\$60 K
22313401	Advanced Manikin (ADAM) - FSS SUPPORT	-----			\$4 K	\$4 K	\$4 K	\$12 K
22313401	Advanced Manikin (ADAM) - FSS SUPPORT	F33615-89-C-0574	\$88 K	\$115 K	\$115 K	\$130 K	\$130 K	\$578 K
22313401	Advanced Manikin - FSS SUPPORT	-----		\$4 K				\$4 K
22313401	Telepresence - FSS SUPPORT	-----	\$ K	\$ K				\$1 K
22313403	Telepresence - FSS SUPPORT	-----	\$5 K					\$5 K
22313403	Telepresence - FSS SUPPORT	F33615-89-C-0574	\$66 K					\$66 K
22313408	HUMAN SENSORY FEEDBACK - FSS SUPPORT	-----		\$10 K				\$10 K
22313408	HUMAN SENSORY FEEDBACK - FSS SUPPORT	-----		\$5 K	\$10 K	\$10 K	\$10 K	\$35 K
22313408	HUMAN SENSORY FEEDBACK - FSS SUPPORT	F33615-89-C-0574		\$101 K	\$110 K	\$110 K	\$110 K	\$431 K
22313401	Sim Auditory Localization - FSS SUPPORT	F33615-89-C-0574		\$63 K				\$63 K

## Future Year Plans for RDT&amp;E Funding 6.2 Program Elements

WORKUNIT NUMBER	WORKUNIT TITLE AND COMMENTS	CONTRACT NUMBER	FY 90 COST	FY 91 COST	FY 92 COST	FY 93 COST	FY 94 COST	5-YEAR TOTALS
72313903	AUDIO WORLD - ESS SUPPORT	F33615-89-C-0574	\$54 K	\$7 K	\$70 K	\$70 K	\$70 K	\$271 K
*****	SUBTOTALS FOR ***** 7231		\$2,649 K	\$2,600 K	\$2,864 K	\$2,935 K	\$2,810 K	\$13,858 K
***** GRAND TOTALS *****			\$12,843 K	\$13,734 K	\$14,001 K	\$13,048 K	\$12,827 K	\$66,452 K

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FY 91 AAMRL 6106MD SUPPORT BUDGET  
CURRENT ALLOCATION AMOUNTS/1000

EEIC	DESCRIPTION	BB-571	HE-573	1H-574	CC-575	VS-576	SS-577	11-579	SUBTOTAL
140	EQUIPMENT (OVER \$15K)	.0	.0	.0	.0	.0	.0	.0	.0
14000	EQUIPMENT	.0	.0	.0	.0	.0	.0	.0	.0
*****140 TOTAL:									
391	CIVILIAN OVERTIME	.0	.0	.0	.3	.0	.0	.2	.5
392	CIVILIAN PAY	2255.0	2907.3	545.4	160.3	.0	.0	891.1	6898.7
39201	OTHER	-160.6	-20.3	-111.9	.0	.0	.0	.0	-444.4
39203	GM-Awards	.0	.0	.0	.0	.0	.0	.0	.0
39204	GS-Awards	.0	.0	.0	.0	.0	.0	60.0	60.0
39205	Payraise	.0	.0	.0	.0	.0	.0	.0	.0
39206	Scientific Achievement Awd	.0	.0	.0	25.6	.0	.0	.0	25.6
393	CIVILIAN PERSONNEL BENEFITS	375.8	482.8	102.6	38.1	.0	.0	142.4	1161.8
39301	Other	.0	.0	.0	.0	.0	.0	.0	-8.1
395	CIVILIAN MOVING ALLOWANCES	.0	.0	.0	.0	.0	.0	.0	.0
39500	PCS	.0	.0	.0	.0	.0	.0	.0	.0
396	CIVILIAN LUMP SUM	.0	31.7	.0	.0	.0	.0	.0	31.7
*****39X TOTAL:									
		2470.3	3401.5	536.1	224.3	.0	.0	1093.6	7725.8
407	IDY-ASIF-MSN	.0	.0	.0	.0	.0	.0	.0	.0
408	IDY-MISSION-TRANSPORTATION	.4	5.0	1.5	7.6	.0	.0	.0	21.2
40810	IDY-Site Visit	3.4	.3	.0	8.9	.0	.0	1.0	13.6
40820	IDY-Information Meeting	.3	.0	1.0	7.0	.0	.0	1.0	9.4
40830	IDY-Training	.0	.8	.5	1.4	.0	.0	.0	2.7
40840	Speech/Presentation	.0	.0	.0	.4	.0	.0	.0	.4
40850	IDY-Conference	.0	.0	1.2	2.4	.0	.0	5.2	8.9
40870	IDY-Special Mission	.0	.0	.0	.0	.0	.0	.0	.0
40880	IDY-Guest/Consultants	.0	.0	.0	.4	.0	.0	.0	.4
409	IDY-MISSION PER DIEM	.2	7.2	.8	14.5	.0	.0	5.2	27.9
40900	IDY-Other	.0	.0	.0	.0	.0	.0	.0	.0
40910	IDY-Site Visit	3.4	.2	.0	5.4	.0	.0	1.3	10.3
40920	IDY-Information Meeting	.0	.0	.9	4.1	.0	.0	1.5	6.5
40930	IDY-Training	.0	4.3	1.2	1.6	.0	.0	.0	7.1
40940	Speech/Presentation	.0	.0	.0	.5	.0	.0	.0	.5
40950	IDY-Conference	.8	.0	3.2	2.0	.0	.0	7.3	13.3
40970	IDY-Special Mission	.0	.0	.0	.0	.0	.0	8.8	8.8
40980	IDY-Guest/Consultants	.0	.0	.0	.1	.0	.0	.0	.1
*****40X TOTAL:									
		8.4	17.9	10.4	56.5	.0	.0	38.0	131.1
421	PCS TRAVEL-Relocation for Civilians	.0	.0	.0	.0	.0	.0	.0	.0
42100		.0	.0	.0	.0	.0	.0	.0	.0
*****421 TOTAL:									
462	COMMERCIAL AIR-TRANSPORTATION PROPERTY	.0	.0	.0	.0	.0	.0	.0	.0
463	TRANSPORTATION COMMERCIAL SURFACE	.0	.0	.0	.0	.0	.0	1.2	1.2

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FY 91 AAMRL 6106MD SUPPORT BUDGET  
CURRENT ALLOCATION AMOUNTS/1000

EEIC	DESCRIPTION	BB-571	HE-573	TH-574	CC-575	VS-576	SS-577	TI-579	SUBTOTAL
46300	Civilian PCS	0	.0	.0	.0	.0	.0	.0	.0
*****463 TOTAL:									
472	RENTAL/LEASE OF EQUIPMENT	.0	.0	.0	.0	.0	.0	1.2	1.2
47200	Parts-Master	.0	.0	.0	.0	.0	.0	.0	.0
		.0	.0	.0	.0	.0	.0	5.7	5.7
*****472 TOTAL:									
492	ADMINISTRATIVE SWITCHBOARD SYSTEMS	.0	.0	.0	.0	.0	.0	.0	.0
49200	M.O.R.D.	.0	.0	.0	.0	.0	.0	10.0	10.0
*****492 TOTAL:									
495	OFFICIAL TOLLS & SIMILAR CHARGES	.0	.0	.0	.0	.0	.0	.0	.0
49500	M.O.R.D.	.0	.0	.0	.0	.0	.0	20.0	20.0
*****495 TOTAL:									
501	PRINTING AND REPRODUCTION	.0	.0	.0	.0	.0	.0	20.0	20.0
50100	M.O.R.D.	.0	.0	.0	.0	.0	.0	55.0	55.0
*****501 TOTAL:									
521	MAINTENANCE PROJECTS	.0	.0	.0	.0	.0	.0	.0	.0
52103	Cranes and Hoists	.0	.0	.0	.0	.0	.0	.0	.0
52115	Facilities Contract	.0	.0	.0	.0	.0	.0	395.0	395.0
*****521 TOTAL:									
522	REPAIR PROJECTS	.0	.0	.0	.0	.0	.0	.0	.0
52203	Cranes and Hoists	.0	.0	.0	.0	.0	.0	.0	.0
52215	Facilities Contract	.0	.0	.0	.0	.0	.0	170.0	170.0
*****522 TOTAL:									
523	RENOVATION PROJECTS	.0	.0	.0	.0	.0	.0	170.0	170.0
52300	FACILITIES REPAIRS	.0	.0	.0	.0	.0	.0	.0	.0
*****523 TOTAL:									
529	MINOR CONSTRUCTION PROJECTS	.0	.0	.0	.0	.0	.0	.0	.0
52900	Facilities Contract	.0	.0	.0	.0	.0	.0	.0	.0
*****529 TOTAL:									
532	CONTRACT ENGINEERING SERVICES	.0	.0	.0	.0	.0	.0	.0	.0
53200	Other	.0	.0	.0	.0	.0	.0	.0	.0
*****532 TOTAL:									
533	OTHER CONTRACTED CE SERVICES	.0	.0	.0	.0	.0	.0	.0	.0

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FY 91 AAMRL 6106MD SUPPORT BUDGET  
CURRENT ALLOCATION AMOUNTS/1000

EEIC	DESCRIPTION	BB-571	HE-573	TH-574	CC-575	VS-576	CS-577	TI-579	SUBTOTAL
553	CONTRACTUAL EDUCATION TRAINING								
55302	Military Training	.0	2.9	.0	.0	.0	.0	.0	.0
55309	Civilian Training	15.3	11.0	4.8	2.0	.0	.0	3.0	10.8
55319	LT/FT Training	.0	20.7	.0	3.0	.0	.0	11.0	45.1
	*****553 TOTAL:	15.7	34.6	7.4	5.0	.0	.0	14.0	76.7
568	ADPE EQUIPMENT MAINTENANCE								
56800	Other	.0	.0	.0	.0	.0	.0	.0	.0
56801	ISSCO	.0	.0	.0	.0	.0	.0	47.2	47.2
56802	DEC	.0	.0	.0	.0	.0	.0	.0	.0
56803	ORACLE	.0	.0	.0	.0	.0	.0	.0	.0
56804	DEC(MIS)	.0	.0	.0	.0	.0	.0	.0	.0
56805	Wollongong	.0	.0	.0	.0	.0	.0	.0	.0
	*****568 TOTAL:	.0	.0	.0	.0	.0	.0	47.2	47.2
569	NON-ADP EQUIPMENT MAINTENANCE								
56900	Miscellaneous Contracts	.0	.0	.0	.0	.0	.0	.0	.0
56903	Cranes and Hoists	.0	.0	18.2	.0	.0	.0	470.2	488.4
56906	Other Equipment	.0	.0	.0	.0	.0	.0	.0	.0
56915	Facilities Contract	.0	.0	.0	.0	.0	.0	.0	.0
56951	Vehicles, Tires etc	.0	.0	.0	.0	.0	.0	3.0	3.0
	*****569 TOTAL:	.0	.0	18.2	.0	.0	.0	473.2	491.4
582	CONTRACT ADP SERVICES								
58200	Other	.0	.0	.0	.0	.0	.0	.0	.0
58202	ADPE Software Support	.0	.0	.0	.0	.0	.0	29.7	29.7
	*****582 TOTAL:	.0	.0	.0	.0	.0	.0	29.7	29.7
592	MISC CONTRACTUAL SERVICES								
59200	Miscellaneous Contracts	69.0	1.9	14.5	.0	.0	.0	.0	.0
59203	Registration fee	.7	.5	.9	1.0	.0	.0	6.7	92.5
59212	DIC/NTIC	.0	.0	.0	.0	.0	.0	1.0	4.1
59215	Facilities Contract	.0	.0	.0	.0	.0	.0	8.0	8.0
59216	Engr. Drafting Contract(TIS)	.0	.0	.0	.0	.0	.0	.0	.0
59217	AAMRL Graphics Contract	.0	.0	.0	.0	.0	.0	.0	.0
59218	TSSI Contract	.0	.0	.0	.0	.0	.0	.0	.0
59221	VAX Operation Task	.0	.0	.0	.0	.0	.0	220.5	220.5
59222	4950t Test Wing	44.0	10.5	3.5	.0	.0	.0	1.0	59.0
59223	Window-On-Science	.0	.0	.0	.0	.0	.0	.0	.0
59224	BEAMS (CE)	.0	.0	.0	.0	.0	.0	5.6	5.6
59225	ASD Clothing Division	.0	.0	.0	.0	.0	.0	.0	.0
59226	ASD Computer Center	.0	.0	.0	.0	.0	.0	11.0	11.0
59227	ASD Tech Photo	28.2	13.1	3.2	.0	.0	.0	3.0	47.5
59228	AAMRL Graphics Contract	.0	.0	.0	.0	.0	.0	8.9	8.9
59229	T.S.S.I. Contract	.0	.0	.0	.0	.0	.0	.0	.0

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FY 91 AAMRL 6106MD SUPPORT BUDGET  
CURRENT ALLOCATION AMOUNTS/1000

EEIC	DESCRIPTION	BB-571	HE-573	TH-574	CC-575	VS-576	SS-577	TI-579	SUBTOTAL
59240	Technical Library	.0	.0	.0	.0	.0	.0	.0	.0
59241	P.M.E.L.	.0	.0	.0	.0	.0	.0	36.0	36.0
59255	Animal Husbandry	.0	.0	.0	.0	.0	.0	.0	.0
59290	Membership Subsc./Accreditation fees	1.2	.0	3.1	.0	.0	.0	.0	4.3
*****32 TOTAL:									
		143.1	26.0	25.2	1.3	.0	.0	301.7	497.3
598	MILITARY AWARDS	.0	.0	.0	7.0	.0	.0	.0	7.0
599	RBA-RECEIVED (CREDIT)	.0	.0	.0	.0	.0	.0	.0	.0
59901	OTHER	.0	.0	.0	.0	.0	.0	.0	.0
*****599 TOTAL:									
		.0	.0	.0	.0	.0	.0	.0	.0
600	SUPPLIES- STOCK FUND	.0	.0	.0	.0	.0	.0	.0	.0
60303	Helium/Liquid Nitrogen	.0	.0	.0	.0	.0	.0	.0	1.2
60404	Medical	1.5	.1	79.0	.0	.0	.0	4.4	85.0
60410	Medical RBA	.0	.0	.0	.0	.0	.0	.0	.0
60505	Non-Medical SSD-Sup	40.1	.1	.1	.0	.0	.0	.0	40.3
60909	Non-Medical	39.0	14.5	12.4	5.0	.0	.0	156.7	227.6
*****60X TOTAL:									
		80.6	14.7	91.5	5.0	.0	.0	162.2	354.1
610	SUPPLIES- NON-STOCK FUND	.0	.0	.0	.0	.0	.0	.0	.0
61414	Medical Issues	.0	.0	73.9	.0	.0	.0	.0	73.9
61800	Clothing Sales	.0	.1	.0	.0	.0	.0	.0	.1
61901	Library	.0	.0	.0	.0	.0	.0	.0	.0
61903	GSA Billings	.0	.0	.0	.0	.0	.0	5.0	5.0
61907	Animal Feed/Bedding Contract	.0	.0	31.0	.0	.0	.0	.0	31.0
61919	Non-Medical	2.4	4.1	112.2	.2	.0	.0	102.5	221.3
61959	Other Supplies	.0	.0	6.0	.0	.0	.0	.0	6.0
*****61X TOTAL:									
		2.4	4.2	223.0	.2	.0	.0	112.5	342.4
624	MEDICAL EQUIPMENT AFSF	.0	.0	.0	.0	.0	.0	.0	.0
627	ADPE AFSF EQUIPMENT	.9	23.4	.0	.0	.0	.0	9.2	33.5
628	SMALL EQUIPMENT (AFSF)	.0	.0	.0	.0	.0	.0	.0	.0
62800	SF Small Equipment	.0	.0	.0	.0	.0	.0	.0	.0
*****628 TOTAL:									
		.0	.0	.0	.0	.0	.0	.0	.0
634	MEDICAL EQUIPMENT NON-AFSF	.0	.0	.0	.0	.0	.0	.0	.0
63400	Other	.0	.0	10.9	.0	.0	.0	.0	10.9
*****634 TOTAL:									
		.0	.0	10.9	.0	.0	.0	.0	10.9
637	DIRECT COMPUTER PURCHASE	.0	.0	.0	.0	.0	.0	.0	.0
63700	ADPE	12.9	5.5	1.5	.0	.0	.0	21.9	41.8

20-JUN-91

FY 91 AAMRL 6106MD SUPPORT BUDGET  
CURRENT ALLOCATION AMOUNTS/1000

FISC	DESCRIPTION	BB-571	HE-573	TH-574	CC-575	VS-576	SS-577	TI-579	SUBTOTAL
	*****637 TOTAL:	12.9	5.5	1.5	.0	.0	.0	21.9	41.8
639	OTHER EQUIP-NON AFSF (UNDER \$15K)	.0	.0	.0	.0	.0	.0	.0	.0
63900	EQUIP (under \$15K)	.8	.0	36.8	.0	.0	.0	.7	38.3
63901	Small Equip (under 15K)	.0	.0	.0	.0	.0	.0	.0	.0
	*****639 TOTAL:	.8	.0	36.8	.0	.0	.0	.7	38.3
641	BULK FUEL-AFSF	.0	.0	.0	.0	.0	.0	3.0	3.0
	06MD TOTALS	2735.1	3527.9	960.8	299.3	.0	.0	2969.8	10492.9



The summary figures presented in this Technology Management Review document are not to be considered as the definitive accounting for costs and labor hours. The summaries are valid only for general planning and relative cost comparisons among various management categories.

There are many reasons why these summations gathered through the AAMRL Automated Management Information System may not match data from official Air Force accounting systems. For example, when computing the civilian salary costs that may be attributed to workunits and tasks, we must deal with figures extracted from two separate Air Force systems - the AFSC JOCAS (Job Order Cost Accounting System) and the Air Force payroll system.

Data on hours worked are fed into the payroll system by time cards and into the JOCAS system through a separate automated collection system. The payroll system contains no information about individual workunits, and the JOCAS system uses estimated overhead rates and average salary rates to determine labor costs per workunit. Hourly rates for employees in the payroll system do not include costs that AAMRL must pay for matching government contributions to Social Security, insurance plans, or awards. JOCAS incorporates military costs into overhead rates.

The AAMRL Management Information System estimates labor cost for each task by multiplying civilian hours reported to JOCAS by the salary rate (at the end of the fiscal year) for the persons charging those hours against the task. While this may provide a valid comparison for direct labor charges among various tasks, the total labor costs shown in these summaries will not exactly match the total dollars disbursed. For example, should a person receive a raise in the middle of the year, the annual labor cost attributed to that person will be overestimated.

Summaries of hours worked by a branch or division will not reflect the total personnel count of the organization at the end of a reporting period due to the mid-year arrivals and departures or personnel in long-term full time training status. All military labor costs are excluded from this report because pay for military personnel is disbursed from Denver and is not included in AAMRL support budgets.

Supervisors have projected future labor hours by workunit for all current AAMRL personnel. Costs for labor support in future years are estimated by applying projected pay raise multipliers to the latest available costs for a full fiscal year; there is no provision for tracking promotions, step increases, or other adjustments in pay.

Task costs for Research and Development contracts and for associated Engineering Support Services (ESS) are taken from the actual Purchase Request records and should be relatively accurate. Projected R&D expenditures for future years, however, are only estimates based on predicted congressional allocations. The funding estimates must be continuously modified due to the usual budget cuts or increases, research and development breakthroughs, and changing Air Force priorities.

Non-salary support costs for these TMR summaries are drawn from the Division fund-tracking records for travel, training, supplies, equipment, and maintenance. Total support costs on these task summary sheets will not match the total O&M budget, since some costs are charged to overhead or general support JOCAS numbers. We have not attempted to pro-rate to any of the individual tasks the overhead costs that are attributed to multiple tasks or distributed over the entire laboratory, so total task costs are usually underestimated.